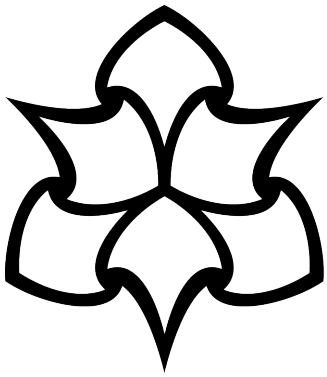

Trust as an influencer of the intention to use mobile banking smartphone application in Saudi Arabia.

PhD
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A thesis submitted in partial fulfilment of the requirements of Manchester Metropolitan University for the degree of Doctor of Philosophy.

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Dedication

This work is dedicated to my parents.

Acknowledgements

First I must thank ALLAH (GOD) for his blessings and guidance, which have enabled me to complete this study. I then need to pass on my thanks to a number of individuals whose help has been indispensable to me throughout my period of study.

My sincere gratitude goes to my supervisor Professor Jenny Rowley. I could not have completed this project without her guidance, advice, patience and endless support and encouragement. I would also like to thank Dr. Frances Johnson for her valuable contribution to my learning journey.

I send my dearest thanks to my parents, who have supported me and believed in me all my life. Your unconditional love and support have been invaluable. I hope that I have made you proud. Special thanks go to my brothers and sisters also for the way that they have encouraged me to follow my dream.

I cannot forget my little angels Sulaf and Abdullah, who have inspired me to achieve greatness. I hope you forgive me for the times when I was unable to be with you and maybe missed special moments with you.

Finally, I am very grateful to all those people who gave their time to participate in this study. You helped me during an incredible stage of my life, and I am in your debt.

Abstract

The aim of this thesis is to propose and test a trust-based model in the context of mobile banking smartphone application in Saudi Arabia. This research contributes to the limited body of knowledge on trust judgements in mobile banking in the smartphone application era, by highlighting the role of ongoing trust in the customer's intention to use mobile banking application. Banking has long been an area in which trust between banks and their customers has been regarded as pivotal. Despite this, research on trust in mobile banking smartphone applications has received little attention.

Furthermore, distinct from other studies that have measured ongoing trust as a single variable, this study takes as its point of departure a theoretical framework, developed by Gefen *et al*. (2003) and McKnight *et al*. (2002), which proposes four dimensions of trust: familiarity with vendor, situational normality, structural assurance, and calculative based trust. In addition, the proposed model also includes technology adoption factors, usefulness, ease of use and information quality. The relationships between the trust dimensions and adoption variables were included in the research model to explain their effect on the customer's ongoing trust and how the ongoing trust articulated the customer's intention to use as outcome variable.

Mixed method research, including survey and interview, were used to achieve the aim of this study. A survey amongst the customers of two Saudi Arabian banks generated a dataset of 640 questionnaires, which was subjected to structural equation modelling (SEM). In order to gain further insight into the

relationships in the research model, interview data was also gathered from Saudi students in the UK who used Saudi mobile banking applications. Thematic analysis was used to analyse the interview data. The findings from the survey show that trust factors such as familiarity with vendor, situational normality, structural assurance, and calculative trust were the statistically significant factors in cultivating participants' trust, which in turn influenced their intention to use the mobile banking application. In contrast, adoption factors such as usefulness, ease of use and information quality were not statistically significant for customers' trust, although the ease of use and usefulness had considerable impact on users' intention to use the mobile banking application. The interview findings confirm that trust dimensions are crucial to the participant's decision to use the bank application, and offer some insights into how and why this is the case. In addition, the interview findings confirm that usefulness and ease of use are fundamental for the participants' intention to use the bank application but not for their trust. In contrast with findings from the survey, the interview findings show and explain that information quality is one of the most important factors for the participants' trust and use of banking application.

This study contributes to knowledge by formulating and testing a trust-based model in a new type of mobile banking, the bank app. This study demonstrates the importance of trust types in the smartphone banking environment, and it is one of just two studies that combine the adoption variables and types of trust variables in a study on mobile banking. This study also contributes to the knowledge by exploring the decision-making processes associated with mobile banking through the use of a qualitative approach and examines trust in banking in Saudi Arabia. On the basis of the findings in this study, it is

recommended that Saudi banks should consider customer trust as a multidimensional construct and seek to enhance the underlying factors and processes that contribute to the cultivation trust in mobile banking apps. Findings from the interviews are particularly useful in assisting banks to critically examine their clients' perception of trust dimensions and adoption variable factors when they undertake further developments of their banking app.Banks should pay attention to the customers experience through all the bank's online channels, as customer experience in one channel can affect the expectations and trust levels for another.

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List of Abbreviations

TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
IS	Information system
SEM	Structural Equation Modelling
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
IT	Information Technology
3G	The third generation of mobile phone standards
4G	The fourth generation of mobile phone standards
GPS	Global Positioning System
ICTs	Information Communication Technologies
App	Application

Publications

I am currently working with my supervisor on a paper to be submitted to *Internet Research* journal (2/3*).

Conference Presentation

Abstract presented at the 4th International Conference on Information Management (ICIM2018). 25-27 of May 2018, Oxford London, UK.
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Chapter 1. INTRODUCTION

1.1 Chapter introduction

Although many claims have been made regarding the benefits of mobile banking, its level of acceptance is still below that expected by the industry (Febraban, 2015, Kim *et al.*, 2009, Lee *et al.*, 2007, Luo *et al.*, 2010). One of the reasons for this may be that there is a lack of trust in mobile banking (Alalwan *et al.*, 2016, Shaikh and Karjaluoto, 2015, Luo *et al.*, 2010, Kim *et al.*, 2009, Gu *et al.*, 2009). Furthermore, there are a number of key challenges to the adoption of mobile banking, despite the fact that it is a clearly emerging channel in the banking industry (Susanto *et al.*, 2016, Zhou, 2012a).

There have been a number of studies on the antecedents of trust in mobile banking and the role that trust plays in customers' acceptance of the service (Malaquias and Hwang, 2016, Chemingui and Ben lallouna, 2013,Oliveira, 2014 ,Lee, 2009). However, most of these studies considered trust as a single variable. In addition, seeing trust as multi-dimensional or considering trust types in one single research has been limited in the mobile banking literature. Furthermore, research on the effect of trust on mobile banking typically focuses on mobile banking systems, in general, rather than on a particular type of system such as SMS or mobile web-based or mobile app. There has been limited discussion about the different types of trust and how they may affect overall trust (Gu *et al.*, 2009, Wang *et al.*, 2015). Moreover,

little research has been conducted on the new type of mobile banking, mobile banking through the use of a smart phone application, only one study, Mehrad and Mohammadi (2017) – has taken smartphone applications as a research context. Furthermore, no qualitative research has been conducted on trust and user intention within mobile banking. In general, qualitative research helps to increase the depth and breadth of understanding of any phenomenon (Bryman and Bell, 2011).

This research therefore aims to fill the gap in the literature by examining consumer trust and intention to use a mobile banking smart phone application. This research contributes to the literature on information systems in general, and in the mobile banking context in particular. It does this through testing existing theoretical models in an under-researched context (trust in mobile banking app) and through gathering insights on the nature of consumers' trust judgements in this context. In addition, this research contributes to knowledge by combining trust types and adoption variables in one single research framework. Moreover, the use of mixed methods was significant for this research as no prior research has utilised this research approach. The research results will be of interest to mobile banking managers as they will help them to increase customer trust in mobile banking, which will bring benefits to the banks such as enhancing mobile banking services in general.

The following sections are structured as follows. The background to the research and the research problem are presented in section 1.2. The aim and

objectives of the study are described in section 1.3, while section 1.4 explains the research methodology. The study's context is presented in section 1.5 and section 1.6 demonstrates the contribution that this study makes to the literature. Section 1.7 provides the overall structure of the thesis.

1.2 Research background and research problem

The internet revolution has delivered immense changes to how banking services are delivered to customers and the range of services that can be offered (Lee and Chung, 2009); they now offer ATMs, internet banking, telephone banking and mobile banking (Lee and Chung, 2009). As smartphones with their applications (apps) become more and more a part of people's everyday lives, they are able to access banking services 24 hours a day from almost any location. A smartphone app is a piece of software that has been developed particularly for download and use on a phone or tablet, as opposed to a laptop or desktop computer. An app is part of an information system. In information systems research, the interaction between the user and technology is a key concept; moreover, the evaluation of users' utilisation of the technology is a crucial part of information systems research. Indeed, with mobile banking apps, there is interaction between the customer and the bank app. Therefore, the examination of using such a service would be a valuable area within information systems research.

In information systems, users are increasingly concerned about the security of their information (Richardson, 2008). Indeed, in mobile banking, concerns over security are ranked as the most important obstacle to building trust

(Pegueros, 2012; Zhou, 2012). The perceived level of risk in using banking apps is therefore high, which presents a barrier that bank managers must overcome if they are going to increase the number of customers using bank apps. This needs to be done by fostering trust in a banking app's security. Given that using a mobile banking application involves the customer's money and what they would consider to be sensitive information, the customer must trust the system and know that it is secure, or they will not use it. Moga et al. (2012) attribute the current level of concern over the safety of the Internet to the actions of hackers and the large number of phishing websites. These have undermined customers' trust in online banking. Hertzum et al. (2004) state that users of online banking are most concerned about security when they are processing private data that is sensitive. More generally, a challenging dynamic exists between trust and risk (Mayer et al., 1995; Corritore et al., 2003). In addition, Lee (2005) reported that security concerns can be diminished by trust.

In mobile banking literature, trust – in either form initial or ingoing trust- is considered as one of the most important factors that affect customers' use (Masrek *et al.*, 2014, Lee and Chung, 2009, Zhou, 2011). In addition, trust types play a critical role for customer overall trust and the decision to utilise online systems (Gefen, 2002). Moreover, the behaviour of the customer in using mobile banking has been examined by a number of technology adoption theories such as technology acceptance model, Diffusion of Innovation, Unified Theory of Acceptance and Use of Technology and Task technology fit (Kim *et al.*, 2009, Al-Jabri and Sohail, 2012, Lin, 2011, Oliveira *et al.*, 2014).

However, there are three significant limitations in the existing body of research regarding mobile banking. The first limitation is that there has been limited research on the different types of ongoing trust and how these influence overall trust. Only two studies have examined the trust dimensions within mobile banking in general (Gu *et al.*, 2009, Wang *et al.*, 2015), and mobile banking smartphone application have not been examined with trust types. Previous studies in other areas, such as e-commerce, have established different dimensions of trust, for example familiarity with vendor (knowledge-based trust), institution-based trust (specifically, structural assurance and situational normality), calculative-based trust, cognition-based trust and personality-based trust (Gefen *et al.*, 2003). Cognition-based trust and personality-based trust are concerned with initial trust while the other trust types are concerned with ongoing trust (Gefen *et al.*, 2003). The most cited trust models in the online environment are by Gefen *et al.* (2003) and McKnight *et al.* (2002). Although these models have been tested in research studies on trust in e-commerce, there has been a limited application of them to mobile banking (Gu *et al.*, 2009, Wang *et al.*, 2015). This research therefore adapted and developed the trust models developed by Gefen *et al.* (2003) and McKnight *et al.* (2002). These models are the most commonly cited trust models and most studies conducted on user trust have taken these models as a basis for their research. Gefen *et al.* (2003) and McKnight *et al.* (2002) included the impact of dimensions of trust: familiarity with the m-banking vendor, calculative- based trust, structural assurance and situational

normality. As these types are compatible with the ongoing trust, which is the interest of this research.

The second limitation is that previous studies on mobile banking application have overlooked other variables that have been shown to be an important antecedent of customer trust and the use of mobile banking. Adoption variables emerging from the TAM, proposed by Davis *et al.* (1989), are widely used in exploring users' attitudes towards a number of technologies. The key variables in the TAM model are usefulness and ease of use. A number of researchers have confirmed that this model can better explain behavioural intention towards the use of information systems than other adoption and intention to use models, such as TRA and TPB; this is due to the significance of the TAM constructs – ease of use and usefulness (Lai *et al.*, 2010, Gentry and Calantone, 2002, Davis *et al.*, 1989). One of the beneficial features of the TAM, which distinguishes it from other adoption theories, is that it guides system designers to the area most in need of development effort, as ease of use and usefulness are two dimensions of mobile banking that system designers can control to some extent. In this study, the main constructs of the TAM model, usefulness and ease of use, will be used.

Furthermore, because smartphone application is a type of information system, this is another aspect that must be addressed in this research (Delone and Mclean, 2004). The most widely used model for information systems is that introduced by Delone and Mclean (2004). The three variables considered in this model are: system quality, information quality and service quality.

Information quality has been highly utilised in previous studies as a success variable influencing intention to use (Akter *et al.*, 2013, Chiu *et al.*, 2017, Shareef *et al.*, 2018, Shaikh and Karjaluoto, 2015). However, it has not been widely investigated in the context of trust in mobile banking (Lee and Chung, 2009). The decision was therefore made to incorporate this variable into the research framework.

Finally, no qualitative research has been conducted on customer trust and use in mobile banking, or more precisely on mobile banking smartphone application. Thus, it is important to consider this gap in the literature. In order to understand the issue of trust dimensions and adoption variables within mobile banking in one framework, it is necessary to employ mixed research methods.

1.3 Research Questions

After identifying the gap in customers' trust and the use of mobile banking with smartphone application, the following research questions were established:

RQ1. How important is customer trust to customers' intention to use mobile banking smartphone application?

RQ2. What is the relationship between trust types and customers' overall trust?

RQ3. What is the relationship between the adoption variables, such as TAM constructs and information quality, with customer's intention to use on the one hand and customer trust on the other hand?

RQ4. What are the customers' perceptions regarding the trust types and adoption variables and how they affect their overall trust and use of mobile banking application?

1.4 Aims and objectives

This study aims to propose and test a trust-based model in the context of mobile banking smartphone application in Saudi Arabia. The theoretical framework for this study will be based upon these developed by Gefen *et al*. (2003), McKnight *et al*. (2002). Their trust models are the most commonly used to examine customer trust in online technology, and for this study they were adapted and tested. To achieve this aim, the following objectives are established:

1. To review the technology adoption theories in mobile banking and summarise the key variables that affect customer use.

2. To summarise theoretical frameworks regarding trust in technology contexts and the key findings of previous studies in the different aspects and conceptions of trust in mobile banking.

3. To propose and test a trust-based model of the factors that affect customers' trust and intention to use Saudi mobile banking smartphone application.

4. To gather deeper insight into the factors involved in the use of mobile banking app and the interaction between these factors.

5. To provide recommendations for enhancing Saudi banks and their mobile application.

1.5 Research methodology

The research framework and the hypotheses for this study have been built on the literature review and previous studies. A mixed-method approach was employed. The data was gathered through a questionnaire and interviews. The proposed model was tested using a survey, and the nature and impact of the variables explored in greater detail through the interviews.

The quantitative research element follows the design proposed by Bryman and Bell (2011). These researchers suggested that in quantitative research, the processes to be followed are elaborating a theory, drawing up the hypotheses, choosing a research design and measure of concepts, collecting the data, analysing the data, developing the findings, and drawing the conclusions.

In this study, the questionnaire used a seven-point Likert scale with a range of 1 for strongly disagree to 7 for strongly agree. The questionnaire was pilot tested with twenty participants who were users of mobile banking. The feedback resulted in some re-formulation and re-wording of the questions.

The questionnaire was disseminated both as a hard copy and online, targeting users of banking app from two selected bank in Saudi Arabia. From

the 1000 hard copies distributed, 250 replies were received. Social media and email were used to distribute the online version; this received 900 responses. After the data had been cleaned and outliers removed, 640 valid questionnaires were retained for in-depth analysis. These were used as the basis for data analysis, which was conducted using the Statistical Package for Social Sciences (SPSS) and AMOS.

The interview data were collected from Saudi students who currently live in the UK and have used smartphone banking application. Before gathering the main interview data, two pilot studies were prepared. The feedback resulted in some changes in the questions such as rewording. Then, an email indicating the purpose of the study was sent to the Saudi Students Club (students community) in the UK. Ten interviews were conducted, with six female students and four male students, respectively. After collecting the interview data, thematic analysis was employed to establish the main themes arising from the interviews.

1.6 Context of the study

1.6.1 Mobile banking applications

The financial services industry is important to both individuals and the national economy. Any economically active individual is virtually forced to use them as there are few alternatives (Davies 1996). It was decided to select the financial services sector as this study's context because it is a sector that has seen dramatic changes to the distribution of an established service through the impact of technological development (Howcroft and Beckett 1996). Financial services saw the potential in the rapidly and continuous evolution of

new mobile technologies, and they have used these to generate a much deeper level of interaction with their customers than they had before the technological revolution (Riivari, 2005). The increasing number of interactive banking applications has two main advantages for banks – these applications can become an important part of a customer's regular mobile routine, thus increasing interaction, and they can also be used as a differentiating factor that attracts new customers and then encourages them to remain loyal in the future (Ibid).

The development of mobile banking started in the latter part of the twentieth century. Telephone banking was a real innovation for customers who wanted up-to-date information without going into their branch. Services have progressed now to the widespread use of mobile banking, where customers can conduct their financial affairs through their mobile equipment (Al-Jabri and Sohail, 2012). Kim *et al.* (2009) highlight that the increased spread of mobile phones has enabled various types of mobile banking such as message-based (SMS), browser-based and client-based. With SMS banking, customers can receive messages from their banks, such as updates on their accounts. However, with the growth and enhancement in communication technology, the use of browser-based or internet-based banking has increased (Yadav *et al.*, 2016). In this type, customers can access the bank website through the internet page located on their phones; however, presenting a web page on a small screen would make users experience some difficulty, as customers would still use the typical banking website on their mobile phone. To overcome such difficulties, the latest type of mobile banking was introduced. This is known as mobile banking applications (banking app), client-based banking or bank apps. These have characteristics such as a simple page layout, they are user friendly, advanced and have an easy security process. Banking apps have proliferated in quantity and use as the level of smartphone use and technological sophistication have risen (Mehrad and Mohammadi, 2017). The apps are now available to users on Windows, IOS and Android. Users can download banking apps from the banks themselves or from app providers. When such applications are installed, customers can make any

number of transactions – transferring funds, monitoring their balance, paying bills or locating the nearest ATM machine. This app presents the bank's web page in a simple format compatible with screen size and it benefits from smartphone features such as biometric access and internet connection (Ibid).

1.6.2 Saudi Arabia

It has been pointed out that technology adoption theories were developed in the West and in developed countries, and thus they reflect the values, beliefs and attitudes of these countries, and may not be readily applicable to developing countries (Al-Sobhi *et al.*, 2011). Each country should then look at this matter from the point of view of its own citizens, and, specific to the topic of this study, explore the factors affecting trust and the use of mobile banking among their own population (Aladwani, 2002). Thus, several studies in different countries have been conducted on mobile banking usage and customer's trust. For example, a study was conducted on SMS and web-based banking in Pakistan (Afshan and Sharif, 2016), on mobile banking in India (Priya *et al.*, 2018), on mobile banking application via smartphones in Iran (Mehrad and Mohammadi (2017), on smartphone banking in Korea (Kim and Kang, 2012), on mobile banking internet -based banking in China (Zhou *et al.*, 2010) and on mobile banking in general in Taiwan (Lin, 2011). To date there have been no previous studies on trust in mobile banking through smartphone application in Saudi Arabia.

Since 2012, Saudi Arabia has been the victim of a number of virus and hacking attacks. Some banks and government organisations such as Saudi Arabian Monetary Authority (SAMA) advised customers to discontinue using

mobile application until it was confirmed that these were safe. Despite these cyber-attacks on SAMA and other banks (Bloomberg, 2016), there has been an increase in the number of customers of Saudi banks using mobile banking app. A survey conducted by AVAYA.COM revealed that the majority of banking customers now prefer to do their banking online through mobile app. The survey was conducted in nine countries: the UK, UAE, India and Australia, France, Germany, Italy, KSA and South Africa. This survey showed that the largest number of users who use mobile banking smartphone application was in Saudi Arabia. A great deal of effort and investment have therefore been put into the technology to facilitate the delivery of these new banking channels to customers (AVAYA, 2017).

This research was conducted in two banks in Saudi Arabia: Samba, the financial group bank, and the Al Rajhi Bank. The latter was selected because it is the oldest established Islamic bank in Saudi Arabia and the Middle East. It has the most branches and the largest number of customers (Al Rajhi Bank 2017). The Samba banking group was selected for the reason that in 2016 it received 13 awards by Banker.com and Global Finance.com (Samba the financial group, 2016)**.** These included Best Saudi Bank for International Clients and Best Bank in Saudi Arabia. It is an important bank in Saudi Arabia, as demonstrated by the fact that it was named the second strongest bank in the Middle East, and the strongest bank in Saudi Arabia (Samba the financial group, 2016).

1.7 Contribution

This study makes several different contributions. The literature revealed that most studies that have investigated mobile banking have focussed on mobile banking in general and not on a specific type of mobile banking such as mobile banking smartphone application. This research adds to the existing research on mobile banking by investigating the use of a new type of mobile banking, which uses smartphone application, and the role of customers' trust in customers' intention to use the application. This study is the first to examine trust types in the smartphone banking environment.

In addition, this research contributes to online customer trust studies by identifying and combining four trust types in one single research framework. This study is one of just two studies on mobile banking that combine the dimensions of trust with adoption variables to enhance our understanding of trust development in mobile banking.

Moreover, previous studies have used only quantitative empirical research to investigate the importance of trust in mobile banking smartphone application. Thus, this is the first study to explore the decision-making processes associated with mobile banking through the use of a qualitative approach. In addition, the value of this study lies in the fact that this is the first study examining trust and trust dimensions in banking in Saudi Arabia.

The results of this study show that it is important for mobile banking managers to devote effort and attention to developing customer trust in their mobile banking services. For this to occur, they need to have established a

trustworthy image, which they can do by assessing their practices against the different trust types. Furthermore, the study highlights the importance of the usability of mobile banking application so that customers can take full advantage of the features and benefits that the application have to offer.

Consequently, this research shows that by paying attention to trust dimensions and adoption variables, mobile banking managers can enhance the level of trust in their services. Once customers recognise that banks are making efforts to improve application such as paying special attention to security mechanisms, login processes and information presented in the app, customers will trust bank application and keep using them. Therefore, greater efforts should be made to develop customers' trust and use of this service.

1.8 Thesis structure

This thesis comprises seven chapters, plus references and appendices. In Chapter One, the theoretical background and research problem are presented, along with the aims and objectives, the research methodology, the context of the study, its main contributions, and the overall structure of the thesis.

Chapter Two presents the principal theoretical models applied to information systems and mobile banking. The chapter starts with the basic overview of smartphones development, mobile commerce and mobile banking. Then, the main adoption models relating to the use of information systems are presented. Also, the chapter examines various definitions of trust. It also

reviews the literature on trust in online environments and factors affecting the use of information systems and mobile banking. The chapter ends with a review of the financial systems utilised in Saudi Arabia, and information about Saudi mobile banking application.

Chapter Three provides details of the conceptual framework of trust and use in mobile banking that forms the basis of the study. The study is informed by theoretical models associated with trust formation, and technology adoption. The selection of trust variable is informed by the theories of Gefen *et al.* (2003) and McKnight *et al.* (2002). The variables information quality, usefulness and ease of use are drawn from technology adoption models such as TAM and the IS success model. This chapter presents the research framework for this study with its eleven hypotheses.

Chapter Four describes the methodology that was followed in this research, including the methods employed for data collection and analysis. More precisely, it gives details of how the survey sample was selected, the questionnaire developed and the data collected then how these data have been analysed. In addition, the chapter presents the interview procedure, including how the sample was selected and the data was collected. Moreover, the data analysis process is explained for the interviews.

Chapter Five presents the findings and analysis of the questionnaire and the interviews. Various tools for analysis are employed. The chapter also explains how the data was managed and screened, the demographic characteristics of the participants, the relationships between variables, factor loading and SEM

analysis. It also presents the findings from the interviews and finally uses the data to test the hypotheses.

Chapter Six discusses the findings of this research in relation to the previous studies presented in the literature. It also discusses the results regarding the research objectives and questions in order to articulate the research contribution.

Chapter Seven provides information on the theoretical and practical contributions made by the study, along with the implications of its findings, its limitations, suggestions for future research and the final conclusions.

1.9 Chapter summary

The current chapter has presented the context of the research by describing the research background to the phenomenon under study. It has also presented the research aim and objectives, and briefly described the methodology and the thesis structure. The following chapter comprises a literature review, focussing on issues relevant to the subject of this study.

Chapter 2. LITERATURE REVIEW

2.1 Chapter introduction

The literature review was influenced by the research aim. As this research investigates the use of smartphone apps in the banking sector, it is critical to shed light on this technology and how it developed within the information systems arena, including how information systems use smartphone applications to facilitate the interaction between individuals and technology. This section also reviews the history of electronic commerce development as a general umbrella for banking. In addition, as this research takes mobile banking as its research context, it is essential to explain the different types of mobile banking and the services provided by each type. This is critical as this research focusses on a specific type of mobile banking, which is mobile banking apps. Moreover, this research aims to examine the ongoing trust and intention to use mobile banking technology.

In order to research the level of trust and adoption of information systems, there have been a number of theoretical models created, such as: The Technology Acceptance Model (TAM), the Theory of Planned Behaviour (TPB), and the Theory of Reasoned Action (TRA). These theories all take the view that in relation to these systems, the intention to use is influenced by attitude. In addition, theoretical trust models have been used to examine customers' overall trust within information systems. These models focus on trust types and how these dimensions play a significant

role in customers' overall trust. This research takes Saudi mobile banking as its research context. Thus, there is need to address the history of technology on Saudi Arabia banking sector.

In this chapter, section 2.2 provides an over view of smartphone technology. Then, section 2.3 provides a short overview of mobile commerce features while section 2.4 provides definitions and types of mobile banking. In section 2.5, the theoretical models in information technology systems are presented while section 2.6 examines the research that has been utilised in information systems and how mobile banking has been adopted, while how trust is defined and expressed is the subject of section 2.7. Previous research on trust and the numerous facets of online finance, e-commerce and m-commerce are reviewed in section 2.8 while studies on trust within online banking and mobile banking are reviewed in section 2.9. overview of Saudi Arabia is presented in section 2.10. The Saudi Arabia banking sector and the mobile banking services in Saudi Arabia are described in section 2.11. finally, chapter summery is in section 2.12.

2.2 Background on smartphone development

A short history of the smartphone is given in this study, the device being the study's principal concern; in fact, the study of the mobile phone reveals that the technology of mobile telephony commenced in the 1920s (Dunnewijk and Hultén, 2007). Following its introduction in 1979, the first cellular telephone system came onto the commercial market in 1983 (Agar,

2013). The initial stage of mobile telephone development involved car phones in New York and Boston (Agar, 2013).

the first European nations to introduce this technology was Sweden, where the standard known as the Nordic Mobile Telephone was introduced. This standard enabled the potential consumers to use their mobile devices beyond the home network. Furthermore, from 1982, this technology was developed by other nations in Europe – for example, Denmark, Finland, Iceland, Norway and Sweden (Dunnewijk and Hultén, 2007).

The third generation of standards for mobile phones (3G) was implemented for application on smartphones. These standards had the advantage of allowing certain smartphone attributes such as connection to social media platforms, downloading application and connecting to services that require a speedy and dependable data connection. This technology is known as the Universal Mobile Telecommunication System as it is founded upon GSM standards. In comparison with the earlier 2G network abilities, the 3G network allowed a notable increase in voice and data communication capacity (Dunnewijk and Hultén, 2007). This resulted in more customers being able to connect to a network (Tan *et al.*, 2007).

Smartphone development commenced in 1992 with the introduction of the Simon phone (McCarty, 2011). This was followed by the Nokia 9000 in 1996 which provided new features; for example, word processing, web browsing, spreadsheets and email. The next development was by Ericsson in 1997 with the introduction of the GS88 with stylus and touchscreen (Martin, 2014). During the first few years of the twenty-first century,

several manufacturers entered the smartphone development field and produced a greater number of models; for example, the N and E series, with the Symbian operating system manufactured by Nokia, a leader in the entrepreneurial and business field. There was also BlackBerry and a Windows phone named the Pocket PC (Martin, 2014).

Nevertheless, it was not until Apple produced the iPhone in 2007 that the retail and customer market began to buy in large numbers, as the first iPhone provided services and products exceeding email. The features provided by the Apple iPhone included a large colour display, a finger-friendly layout, multimedia functions, advanced web browser and an application.

However, around November 2007, a free Android operating system was introduced by Google which allowed manufacturers of mobile phones to install an operating system onto their devices. The first manufacturer to offer a smartphone having an Android Operating System (OS) was HTC in 2008. At the present time, many phone providers, such as Motorola, LG, and Samsung, have used the Android system as developed by Google (Martin, 2014).

The characteristics of smartphones differ from their predecessors (mobile phones) in the following three ways: physical, software and connection. Smartphones, at the present time, have larger screens, a standard keyboard design, and normally touchscreen ability. Furthermore, when compared to their predecessors, they normally have more powerful

processors which lead to faster opening of application and loading of web pages as well as improved games (Martin, 2014).

In addition to their operating systems, smartphones have the capability of downloading and installing more application. Furthermore, smartphones are able to connect to 3G and 4G networks and high-speed internet connections (Bridges *et al.*, 2010). Consequently, it is apparent that many advantages are provided by smartphones for their users. These are explained in details below.

2.2.1 Smartphone Features and Services

Smartphones provide several new services and features which include: researching people's lifestyles, information searching, learning, communication, office tools and entertainment (Gao *et al.*, 2012). The following features are also provided by smartphones: cameras, complete QWERTY keyboard functions, fast access to the internet, file management, Global Positioning System (GPS), large displays having high screen resolution, a multi-talking operating system, Radio Frequency Identification (RFID), storage expansion, biometric information, Bluetooth and Wi-Fi connections, powerful processors and synchronisation ability (Chang *et al.*, 2009). A growing number of smartphones are, at the present time, fitted with more sophisticated features, for example, accelerometer, barometer, digital compass, fingerprint ID and gyroscope (Phonearena, 2018)

smartphones include a GPS system which obtains information from a minimum of three satellites. This establishes the current location, velocity and time (GSMArena, 2018). GPS application are used by application such

as navigation, mobile social networks, searches and location searching (Liu, 2013). Users are able to make a location search that includes their current location, and which will therefore show searched locations close by. For example, a search for a restaurant will show only those restaurants that are close to the user's location.

Additional features include a gyroscope to detect the device's orientation and an accelerometer which evaluates linear acceleration of movement. A digital compass enables the smartphone to establish directions, which is of assistance in map application (GSMarena, 2018). Consequently, a smartphone will indicate if it has been moved, implying the movement of its user.

One of the principal advantages indicated by research on mobile phones is that their email function encourages cooperation between colleagues; such cooperation is mainly helped by improving work procedures and keeping team members up to date regarding work progress (Beurer-Zuellig and Meckel, 2008). Smartphones have personal organiser functions like automatic reminders and contact lists, which help users to become better organised (Is4profit, 2010). Furthermore, due to their instant connections, smartphones offer their users instant information which includes maps and satellite navigator as well as news and weather reports, traffic information, currency and share prices (Is4profit, 2010). Other useful features of smartphones are their camera features which combine with voice and text communications to enable the sharing of images or the utilisation of a

video call. These features supply an enhanced business experience with regard to communication (Is4profit, 2010).

The entertainment feature of smartphones is also well known, such as the provision of music and videos (online and offline). Smartphones also allow movie, video and music files to be copied and stored and subsequently played, due to the large storage capacity and powerful processing capabilities of the devices. Furthermore, applications like Netflix, Google Play Movie and YouTube provide users with the option to watch movies online because of faster internet connections. In the entertainment field, smartphones can be used to play games of different types, for example arcade format, adventurous, board and card games, educational and puzzle games, as well as sports and strategy. Also, in this field, smartphones enable users to connect with online social networks, for example Twitter and Facebook. A further application of smartphones is their flexibility in their ability to connect with other devices like televisions and to log activities of cars, as well as electronic devices in people's homes (Kun *et al.*, 2013). Consequently, we can draw the conclusion that smartphones are considerably beneficial to their users.

It is indisputable that the principal features of smartphones are the applications (apps) as these improve and extend the use of mobile phones. A smartphone app is a piece of software that has been developed particularly for download and use on a phone or tablet, as opposed to a laptop or desktop computer. It makes sense for a company to develop an app if they wish to increase their level of engagement with their customers

or to have a piece of software that is more like a computer program than a website (Inukollu et al ,2014). Mobile apps are different to general software in the following ways: they are optimised for use on mobile devices with a touch-activated screen and in general they are designed for personal use. Mobile apps can be downloaded from a central online marketplace which also gives users the opportunity to review the app, give it a rating, and view lists of apps grouped according to their rating by users. The main aim of these apps is to improve and facilitate the user's interaction with technology, which has therefore led information system developers to take advantage of this and provide more apps. Xu *et al.* (2011) state that many smartphone applications are in education, business, books, finance, lifestyle, healthcare, medical, news, weather, travel, reference, social network, navigation, utilities, productivity, photography, music, sports, games and entertainment, among others. Certain applications apply sensors, such as GPS, in order to utilise the current location of users to obtain information concerning news, traffic, weather or other features (Xu *et al.*, 2011).

When designing mobile apps, software designers use platforms that are compatible with various smartphones such as an iPhone, Android phone or Windows Phone. Therefore, most of the firms provide their apps for use on different mobile operating systems. The apps are available for users to download from the app store or the firm's website. Generally, the software designer and the firm are the main mobile app vendors. Within this research, the mobile banking vendor (m-vendor) refers to the bank who provides the mobile banking app as the customers deal with the bank and

not with app developer. Through the use of mobile banking, bank customers can gain access to a vast array of services, including account balance enquiries, paying bills and transferring funds, managing their money and moving it swiftly between accounts. As information systems have been developed, system managers have been appointed, who are very interested in the reasons why bank customers have placed their trust in these services and embraced them. System managers place great importance on understanding these reasons, as it will help them to formulate strategies for enabling people to use modern systems and develop acceptance of them and even a liking for them. If banks create and maintain a good rapport between themselves and users of mobile services, this will assist in creating useful tools that will increase the spread of the adoption of these services.

2.3 Mobile Commerce

2.3.1 Background of mobile commerce

Mobile commerce initially drew attention in 1997 (Asif, 2010). Coca-Cola placed some of their drinks vending machines in Helsinki, Finland, that utilised SMS (short message service) technology to receive payments from mobile phones (Ahmed, 2011). In the same year, Finland also saw the inauguration of the first mobile phone banking service; this was launched by Finland's Merita Bank, again via SMS (Asif, 2010). Finland oversaw another first in 1998 when digital content was sold as downloads to mobile

phones for the first time; these were ringtones, made commercially available by 'Radiolinja', which became a division of Elisa Oyj, the Finnish telecommunications corporation. Just before the end of the 20th century, in 1999, two m-commerce vehicles emerged: the Philippines introduced Smart Money and Japan brought out a mobile internet service, NTT DoCoMo's i-Mode (Ahmed, 2011) .

i-Mode, from Japan, was for a time the world's foremost internet provider, as 34 million people subscribed to NTT DoCoMo (MacDonald, 2003) . The platform successfully integrated strategy, technology, marketing and content. From their portable phones, users could check their emails, see sports results, book tickets for concerts or shows, access financial information and see the weather forecast (Ibid). From this beginning, the doors were opened for business and commerce to offer mobile applications of their online services; as a result, the year 2000 saw the rapid growth of m-commerce. Parking payments were introduced in Norway, Austria allowed train tickets to be bought through mobile services and Japan enabled their customers to buy flights from airlines via their mobiles (Asif, 2010).

2.3.2 Definitions of mobile commerce

There are various names for mobile commerce – wireless commerce, electronic commerce, mobile electronic commerce – but m-commerce is the most common term (Hsieh, 2007, Luarn and Lin, 2005). The definitions of m-commerce vary, depending on people's perspectives. Yen and Lancaster (2007,p.18) describe m-commerce as "the ability to conduct

electronic commerce transactions over wireless media". Following on from this definition, a number of authors refer to m-commerce as an electronic commerce subset, which wireless communication enables to happen (Deitel *et al.*, 2001, Huang, 2007, Turban *et al.*, 2017) .

In connection with the various devices and processes needed to enable its function, m-commerce is referred to as "the promotion, buying, and selling of goods and services through electronic data communication networks that interface with wireless (or mobile) devices" (Tarasewich et al., 2001,p.435). M-commerce can be facilitated via a purchaser and a seller agreeing on the content, price and despatch of an item for sale, and then enabling the transaction to be paid for wirelessly (Yen and Lancaster, 2007).

As m-commerce is a fairly recent innovation and continues to evolve, there are a number of current definitions for it that can be variously interpreted. In each definition in the literature there are common terms: electronic commercial transactions, wireless communication networks, mobile devices, exchanging goods and services, and wireless handheld devices. General agreement exists that the wireless network is the channel through which to effect m-commerce transactions, which are conducted by wireless devices like smartphones and tablets. Certain definitions are non-specific, however, and could be more generally applied to mobile business, while some definitions – particularly the payment element – relate to m-commerce transactions. Those definitions articulated by Turban *et al.* (2017) and Bidgoli (2004), for example, are more applicable to m-

business than m-commerce: 'any business activity' was Turban *et al.*'s (2008) description of m-commerce, while Bidgoli (2004) referred to it as 'all data-driven business transactions'. Business and commerce may be used interchangeably, but they are in fact separate concepts, business covering a wider area of activity than commerce (Turban *et al.*, 2017), which concerns all the endeavour that a firm involves itself in to create and trade in services and goods. Manufacturing goods, producing and monitoring goods, as well as processes such as managing human resources and internal management, are classed as business-related rather than commercial (Tiwari and Buse, 2007). Commerce, on the other hand, tends to be regarded as being involved with actual trade – purchasing, selling and exchanging goods and services, or inter-organisational activities. Business, as a term – although it involves all these commercial activities – has a wider remit. It can involve intra-organisational actions such as reconstructing and reforming the processes of organisations, or establishing collaborative links with potential business allies (Turban *et al.* ,2017). M-business has been described by Eusebio *et al.* (2005) as the deployment of mobile information technologies, which include wireless internet, that facilitate a firm's management, structure and communication across the organisation. M-business is definitely not, according to this definition, solely about commercially trading in goods and services, but it also includes management, communication and coordinating the activities of a firm. M-business thus encompasses all the various processes that allow a firm to create and conduct m-commerce trading. The researcher therefore regards m-commerce as an m-business subset.

2.3.3 The difference between m-commerce and e-commerce

We previously observed that 'mobile e-commerce' tends to be what is understood by 'm-commerce'. The claim by Hsieh (2007) and Tarasewich *et al.* (2001) is that m-commerce constitutes an e-commerce subset, and that it is a subset of every type of e-commerce, encompassing B2C and B2B (Business-to-Business). Other commentators, such as Moshin *et al.* (2003), Luarn and Lin (2005) and Yen and Lancaster (2007), hold m-commerce to be wireless e-commerce, essentially. Numerous studies have revealed that m-commerce resembles e-commerce in many aspects and models, and has few unique characteristics itself. M-commerce is regarded by some commentators, however, as going beyond a subset of e-commerce (Barnes, 2002). Because of its alternative method of interaction, its usage trends and its value chain, Feng *et al.* (2006) hold that m-commerce is much more than just e-commerce, claiming that it represents an innovative way of conducting business, with its flexibility, ability to be used anywhere and the breadth of its coverage. To establish the distinctions between m-commerce and e-commerce, Zhang and Yuan (2002) explored the various dimensions of business models, types of services and technology. The general consensus is still that m-commerce is broadly an e-commerce subset, although the characteristics of the technological components vary. M-commerce's interaction method, for example, differs because of the configurations of terminal devices, while the patterns of use are not the same as those of desktop computers. Both types of service are still conducted electronically by networks that are

computer-run and can be accessed through various telecommunications networks (Tiwari and Buse, 2007). Ultimately, it is held that m-commerce and e-commerce are closely linked and that m-commerce is an e-commerce subset.

The list of m-commerce's advantages over e-commerce is as follows:

1) **Portability**. Small and light, mobile equipment can be easily carried and moved over long distances and times (Junglas and Watson, 2006). This is a big advantage for m-commerce, as users do not have to be at their desks, or at home with their desktop computers: because of their small and manageable size, they can instantly buy something in a shopping environment (Hsieh, 2007).

2) **Accessibility**. M-commerce can be conducted literally anywhere where there is a signal (Hsieh, 2007, Cook and Goette, 2006). Junglas and Watson (2006) confirm this, stressing that round-the-clock business can be done, "assuming that the mobile network coverage is sufficient" (p. 574). Shopping, paying for services, settling invoices, exchanging money digitally, can all be done easily by users of m-commerce any time (Junglas & Watson, 2006). Such flexibility enables mobile device users to acquire information, and do business easily and at their convenience (Andreou *et al.*, 2002).

3) **Localisation**. This concerns the "mobile person's ability to be located" (Junglas & Watson, 2006). If mobile users wish to make maximum use of the services and places in the area in which they are currently located, they can allow service providers to know their location, following which

local companies and organisations can inform them of their goods and services and promote them accordingly (Andreou *et al.*, 2002). Such 'location-based services' can involve geographic data about the mobile user and/or details about the local parties and services (Junglas and Watson, 2006). In order to provide value-added services, in the form of precise geography, localisation is the key factor and is the single most stand-out element of m-commerce (Junglas and Watson, 2006).

4) **Reachability**. Providing that there is sufficient signal strength, and the necessary device is switched on, anyone can be reachable around the clock, 365 days a year (Junglas and Watson, 2006). There may be occasions or reasons whereby a mobile user restricts their reachability to specific times and to certain people, but users of mobiles can be permanently connected without having to always go through a connection procedure, whereas e-commerce must be plugged in and connected to certain computers (Junglas and Watson, 2006).

Due to the rapid spread of wireless services and the expanded use of mobile phones, especially smartphones, m-commerce is predicted by a number of researchers and academics to be the next big growth area of e-business (Ngai and Gunasekaran, 2007, Yadav et al., 2016). They predict that m-commerce will fundamentally change the way that business is conducted, including the various services and means through which it is carried out (Yadav *et al.*, 2016). There are a number of drawbacks to m-commerce, however, which are encapsulated below:

1) **Size of the screen**. Screen size on mobiles is obviously smaller than on desktop computers, and the resolution of the graphics is much lower. The application and its capacity to interact with system users may thus be constrained (Cook and Goette, 2006, Keenan, 2015). Another consideration is the limitations on battery life for mobile equipment (Ibid), which could result in users feeling under pressure to finish transactions hurriedly in case they become disconnected.

2) **Network issues.** Mobile networks have limitations in relation to their bandwidth and connectivity, which are obstacles to using m-commerce, as are increased costs and non-standard protocols (Cook and Goette, 2006, George and Singh, 2015, Keenan, 2015). As connectivity is never guaranteed at a given location, the 'anytime/anywhere' claim of champions of mobile devices (Ibid) has limitations, which intensify if users' signals become compromised by interference in an area, or if signal coverage is weak in any area.

However, as new mobile products and technologies progress, work is being done to tackle their limitations. For example, examining users' acceptance and adoption of this service is one of the key efforts being made to enhance such services (Alalwan *et al.*, 2017, Jun and Palacios, 2016). Besides this, another major hurdle to clear is gaining users' trust in m-commerce and online transactions (Gao *et al.*, 2015, Ponte *et al.*, 2015).

Through the use of mobile equipment, goods and services can appeal straight to an 'individual's pocket'" (Hsieh, 2007, p. 95). Eastin *et al.* (2016) list a number of m-commerce uses, including: mobile shopping –

buying products and services while on the move; buying travel and transport tickets, or tickets for events and entertainment; banking on the move; entertainment purposes – downloading films or videos, music, photographs, games, comparing products and scanning a product barcode. One of the important m-commerce applications is mobile banking. Mobile banking was developed through the years and has many types; these will be illustrated in the next section.

2.4 Mobile banking

Mobile banking technologies can be classified according to the way in which the bank provides access to its services and communicates with its customers. This can be done in three main ways: via text messages, web browsers and smartphone applications. With text messages, these can be used by the bank to send customer alerts on a variety of transactions, such as making deposits and withdrawals, seeking bank balances and making transfers. Depending on the bank, this can be a free service, apart from the text message fee that the phone company charges, or banks may charge an additional fee on top of these charges.

Text messaging can also be utilised to communicate with bank staff, instead of emailing or using a contact centre on the bank's website. It is also possible for customers to text a certain code or instruction that allows a charitable donation to be made from a deposit account, providing the bank has such an arrangement with the charity.

Mobile banking technology also uses mobile web browsers. With these, individuals use smartphones to access an online version of the bank's website, which provides them with full access to their accounts. Through the web browser they can make payments, transfer between accounts and monitor activity on their accounts. This type of activity is not usually subject to a charge by the bank but it may incur data charges from the network provider.

Smartphone banking apps are a relatively new type of mobile banking technology. They provide the benefit of allowing users to access a large number of banking operations with a single touch. As well as the usual transactions such as paying bills and making transfers, some banking apps allow users to take a photograph of a cheque with their phone and deposit the amount in an account. These services are available at any time, without needing to have access to a computer. This makes it easy for customers to monitor transactions and to notify the bank if they see any transactions they do not recognise, thus guarding against fraud.

2.5 Trust

This section will discuss some of the definitions of trust and the links between them. It will focus on definitions that are particularly relevant to the context of e-commerce and m-commerce, and mobile and online banking. From this, the researcher will be able to provide a conceptual definition of trust for this particular piece of research. In addition, the main studies that investigated trust within online banking and mobile banking

are highlighted in order to emphasise the importance of trust in mobile banking and to examine trust's main antecedents.

2.5.1 Definition of trust

Trust has been examined in many different areas of research, such as ICT, communication, management, psychology, marketing and political science. It has therefore been explored from a number of different perspectives, leading to varying definitions of trust. For example, Morgan and Hunt (1994) state that "trust exists when one party has confidence in an exchange partner's reliability and integrity" (cited by Kwon and Suh (2004,p.21). In the study by Mayer *et al.* (1995), trust is defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action or, irrespective of the ability to monitor or control that other party" (p.712). Rousseau *et al.* (1998) define trust as "a psychological state comprising the intention to accept vulnerability based upon positive expectation of the intentions or behavior of another" (p. 395). With regard to trust in the e-commerce context, Ba and Pavlou (2002) define trust as the subjective assessment of one party that the other party will fulfil their obligations according to their expectations, in an environment that is highly uncertain (p. 245). The expectation of fulfilled expectations is also mentioned in the definition of trust in online banking provided by Yousafzai *et al.* (2003) : "a psychological state which leads to the willingness of customers to perform banking transactions on the internet, expecting that the bank will fulfill its

obligations, irrespective of customer's ability to monitor or control bank's actions" (p.849).

In 2003, Gefen *et al.* published a new study about ongoing trust in e-commerce. Their study focused on integrating the TAM model with trust antecedents, and how trust can be maintained in ongoing economic relationships. In their research, Gefen *et al.* defined trust as 'specific beliefs' which consist of integrity, benevolence and ability. Table 1 summarises these elements of trust. From Kim *et al*. (2008) perspective, trust is associated with online vendors "as a consumer's subjective belief that the selling party or entity will fulfill its transactional obligations as the consumer understands them" (p.2). There are several dimensions to consumer trust in online vendors, for example their trust in the brand, their trust in the website, and their trust of the overall company (Ibid). Table 2 summarises the main definitions of trust.

In general, trust can be in two forms: initial trust and ongoing trust. Initial trust can be defined as an individual's willingness to take risks in order to meet their needs, when they have little previous experience or significant information (Kim & Prabhakar, 2004; McKnight & Chervany, 2001). This type of trust is therefore important when consumers are considering adopting a new service that they have no prior experience with, such as m-banking (Kim *et al*., 2009; Kim & Prabhakar, 2004). On the other hand, ongoing trust is dynamic, as it changes over time according to a consumer's experience and interaction with a service. It can therefore be trust in an old or new relationship. Ongoing trust is therefore a product of

real interactions and reflects an individual's belief that the partner in an exchange relationship is reliable and possesses integrity (Hoehle *et al,* 2012). It is significant in the e-commerce environment because here consumers make many repeat purchases. Their experiences with e-vendors gives them direct knowledge and if these experiences are positive, they will be more likely to trust the e-vendor.

The focus of this research will be ongoing trust for a number of reasons. Initial trust is particularly relevant when a consumer is going to purchase a service or product once. In m-banking, repeated interactions are made, therefore ongoing trust is more relevant. Moreover, many customers of m-banking have been using the services for some time and have built up experience with smartphone applications; they have therefore already experienced and passed through the stage of initial trust and are now at the stage of ongoing trust. Finally, it has been shown that consumers change their first impressions of information systems applications as they use them (Hoehle et al, 2012). These changes can be in a positive or negative direction, according to the experience, and consumers can then be encouraged to continue or discontinue their use of the apps (Ibid). It is therefore reasonable to put forward the argument that intention to continue utilising m-banking apps will be impacted by ongoing trust beliefs as they are built on previous experience. The researcher therefore believes that ongoing trust is the most suitable construct for this study and the investigation of consumers' intentions to continue using mobile banking

apps. It should be noted that from this point ongoing trust will be referred to as simply trust.

As the aim of this research is to examine the ongoing trust between the customer and mobile banking app by using technology adoption variables and trust, it uses an adapted definition of trust provided by Gefen *et al.* (2003). There are many reasons for choosing Gefen *et al.*'s (2003) trust definition. First, they claim that trust as 'specific beliefs' is consistent with technology adoption models. Second, the definition is consistent with ongoing trust rather than initial trust. Third, this definition is relevant to many research studies concerned with online transactions and ongoing economic transactions.

Competence	*"The ability of the trustee to do what the truster needs."*
Benevolence	*"Trustee caring and motivation to act in the truster's interests."*
Integrity	*"Trustee honesty and promise keeping."*

Table 1: Trust-specific belief characteristics adapted from McKnight *et al.* (2002)

Author	Definition of trust
Mayer *et al.* (1995)	"The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trust or, irrespective of the ability to monitor or control that other party" (p.712).
Morgan and Hunt (1994)	"When one party has confidence in an exchange partner's reliability and integrity" cited by (Kwon and Suh, 2005, p.27).
Rousseau *et al.* (1998)	"Psychological state comprising the intention to accept vulnerability based upon positive expectation of the intentions or behavior of another" (395).
Ba and Pavlou (2002)	"The subjective assessment of one party that the other party will fulfil their obligations according to their expectations, in an environment that is highly uncertain."
Yousafzai *et al.* (2003)	"a psychological state which leads to the willingness of customer to perform banking transactions on the internet, expecting that the bank will fulfill its obligations, irrespective of customer's ability to monitor or control bank's actions" (p. 849).
Gefen *et al.* (2003)	'a set of beliefs, which consist of competence, benevolence and integrity" (p.75).
Kim *et al.* (2008)	"An online consumer's trust is defined as consumer's subjective belief that the selling party or entity will fulfil its transactional obligations as the consumer understands them". (p.21)

Table 2: Summary of definitions of trust**.**

2.6 Theoretical Models relating to the use of Information Systems

Several factors are involved in how and why people accept information systems, so researchers have constructed number of models to help with the understanding of this. By reviewing users' intentions within the e-commerce environment, it was found that many technology theories were used. These

include: The Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), The Unified Theory of Acceptance and Use of Technology (UTAUT),the Technology Acceptance Model (TAM),diffusion of innovation theory and task technology fit. These theoretical models will be discussed in the succeeding sections.

2.6.1 Theory of Reasoned Action (TRA)

Fishbein and Ajzen (1975) developed this renowned social psychological theory as a way to illustrate the factors that determine intended behaviours. TRA's main aim is to discern the reasons for individuals behaving the way they do (Ajzen and Fishbein, 1980), and it mostly finds that people's behaviour is rational, as they methodically assess extant information before performing a type of behaviour; TRA's theory model is illustrated in Figure 1.

The connection between beliefs, subjective norms, attitudes, behavioural intention and actual behaviour is shown in this model, with real behaviour being largely influenced by people's intention to use.

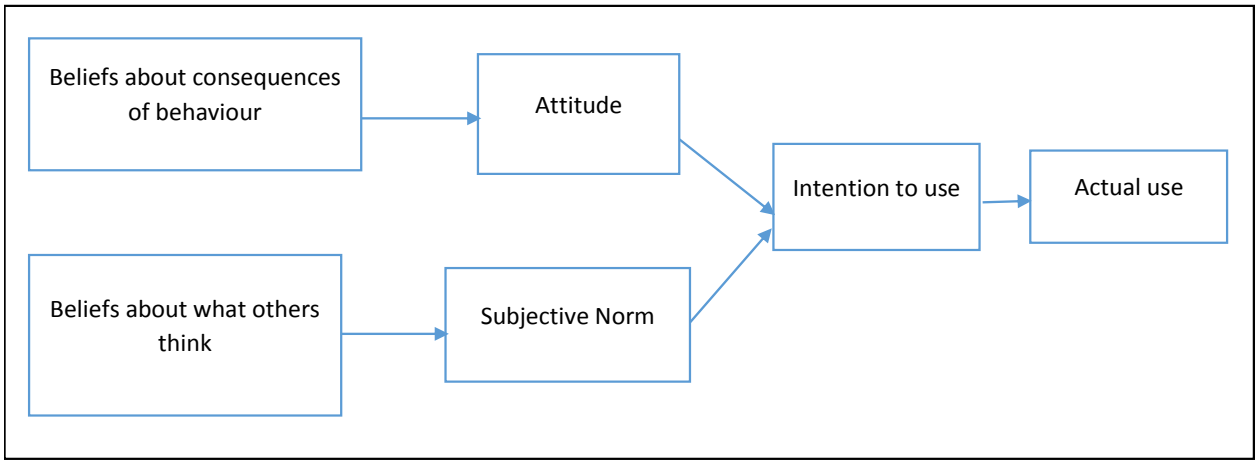

Figure 1: TRA Fishbein and Ajzen (1975)

Behavioural intention is therefore influenced by various subjective norms and attitudes; these norms and attitudes help to predict real behaviour, therefore it can be said that the two principal constructs involved in TRA are attitude and subjective norms. Attitude "refers to an individual's specific beliefs related to the object" (Davis *et al.*, 1989). Subjective norms allude to "the person's perception that most people who are important to him think he should or should not perform the behavior in question" (Teo and Pok, 2003,p.484).

Despite the fact that TRA has been employed extensively, across various academic disciplines, to demonstrate the reasons for intention and behaviour (Ajzen and Fishbein, 1980), there are numerous drawbacks to the theory, particularly as it is applied to certain disciplines (Davis *et al.*, 1989), as it is in essence concerned with general behaviour. The theory fails to identify the actual beliefs related to a particular behaviour (Davis *et al.*, 1989). Furthermore, if a person's ability to control their volition is limited, the case cannot be predicted with TRA (Ajzen, 1985). In order to make up for TRA's shortcomings, Ajzen (1991) formulated a new theory – the Theory of Planned Behaviour (TPB), which is discussed in the following section.

2.6.2 Theory of Planned Behaviour (TPB)

The Theory of Reasoned Action has been subject to augmentation by Ajzen (1991), which concluded with the Theory of Planned Behaviour (TPB). Both theories claim that behaviour emanates from intention (Shih and Fang, 2004). Figure 2 shows that the Theory of Planned Behaviour, like TRA, intimates that attitude and subjective norms influence the intention to use. Ajzen (1991), nevertheless, makes the case for the construct of Perceived Behavioural Control

(PBC) being appended to the theory, to take into account any scenarios where people are not in total command of their behaviour (Shih and Fang, 2004). PBC is a reference to people's opinions on control, balanced by the belief in the control construct's ability to enable the behaviour (Shih and Fang, 2004).

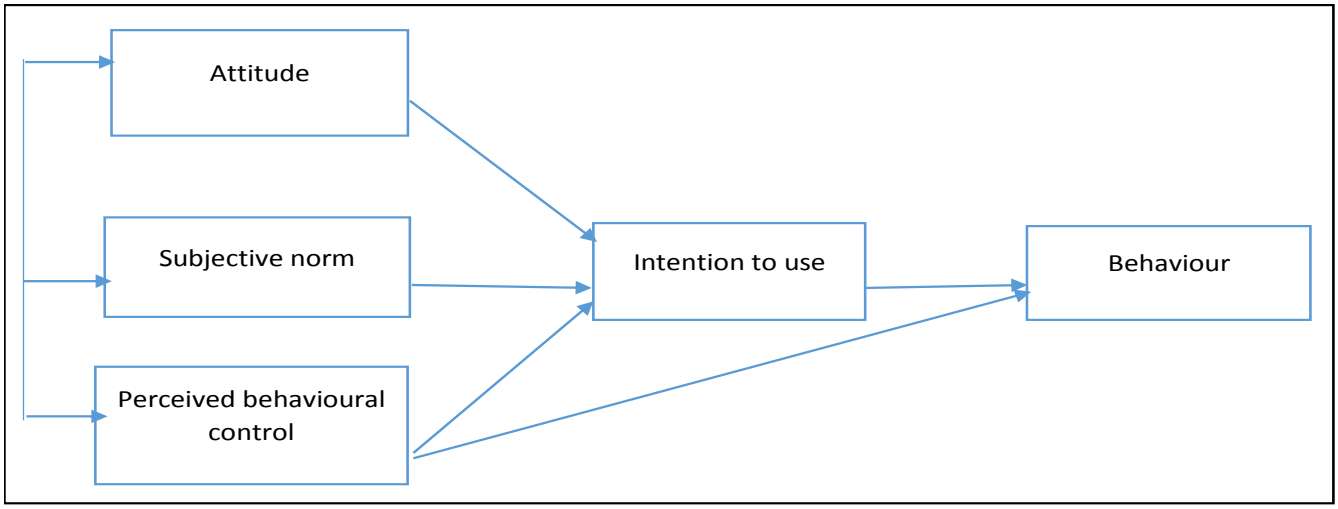

Figure 2: Theory of Planned Behaviours Ajzen (1991)

The theory can be described as a social psychology model, in which the intention to use and the tangible behaviour are influenced by subjective norms, PBC constructs and attitudes. These three factors can be confidently said to forecast intention to enact various behavioural types (Ajzen, 1991). Table 3 lists the definition's fundamental constructs – real-life behaviour is influenced by both intention and ideas of control in behaviour. TPB, particularly regarding the PBC construct, has connections with both. The principal dissimilarity between TRA and TPB is transparently PBC, which Ajzen (1991) appended. It affects real-life behaviour directly, and indirectly over intention to use; Figure 2 illustrates this, making PBC a prime forecaster of intention and consequent behaviour (Taylor and Todd, 1995).

TPB has been used in a variety of ways by several studies in order to provide an analysis of intention to use and real behaviour. The studies collectively provide empirical support for TPB (Mathieson, 1991). Further evidence is provided by Chang (1998), who has shown the Theory of Planned Behaviour to have greater success in predicting real behaviour than the Theory of Reasoned Action.

Several User-Intention models have been developed based on the theory proposed by Ajzen and Fishbein. These have become more popular in recent years, partly because they are able to explain a variety of goal and task behaviours (Muthitacharoen *et al.,* 2006). The following section explores the Technology Acceptance Model (TAM), which is a model used in a wide range of fields. It draws on TRA and TPB and provides a way of predicting how well users will accept new technology.

Constructs	**Definition**	**source**
Behavioural Intention	Refers to "Intention to engage in a behaviour is determined by an individual's attitude towards that behaviour".	Bock *et al.* (2005,p.91)
Attitude	"Refers to an individual's specific beliefs related to the object".	Davis *et al.* (1989)
Subjective Norm	"Refers to an individual's perception of social pressure to perform or not to perform the behaviour".	Davis *et al.* (1989), cited by Teo and Pok (2003,p.484).
Perceived Behavioural Control	"The person's belief as to how easy or difficult performance of the behaviour is likely to be"	Ajzen (1985), cited by Kraft et al. (2005,p.480)

Table 3: Definitions of the core constructs included in the TPB.

2.6.3 Technology Acceptance Model (TAM)

The Technology Acceptance Model, or TAM, is an offshoot of TRA, the Theory of Reasoned Action (Lee, 2009). Whereas TRA submits actual behaviour to be immediately influenced by intention, in TAM, perceived usefulness and ease of use are vital constructs for deciding the use of particular systems in organisations (Cheng *et al.*, 2006); this is shown in Figure 4. System use is predicted more accurately in these two constructs: "Perceived usefulness reflecting a person's salient belief in the use of the technology will be helpful in improving performance", while "Perceived ease of use is a person's salient belief that using the technology will be free of effort"(Taylor and Todd, 1995), cited by Lee (2009,p.131)

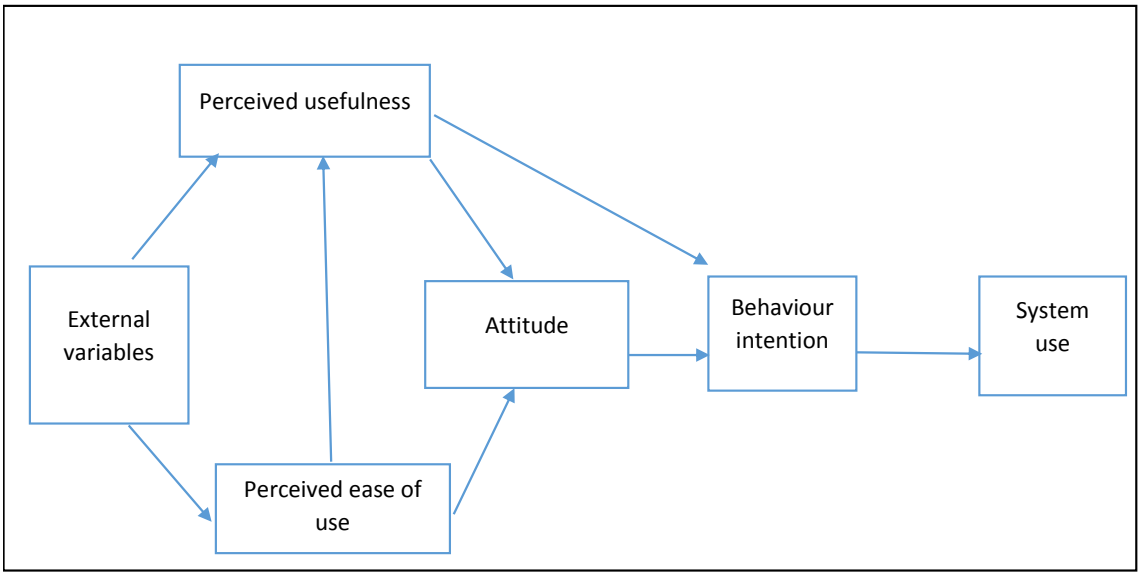

Figure 3: Technology Acceptance Model (Davis, 1989).

TAM was created by Davis (1989) for estimating the extent to which consumers might adopt IT; how customers embrace a system of information is dependent

on the level of their intention to make use of it. There are two beliefs that influence intention to use: perceived ease of use and perceived usefulness (Cheng *et al.*, 2006). TAM has been utilised by a variety of studies, becoming a particularly well-used vehicle for forecasting how internet systems might be embraced, how e-commerce might be accepted, and how online banking might be adopted (Lee, 2009, Lederer *et al.*, 2000, Chen and Cheng, 2009).

The TAM is adapted from TRA, therefore it shares some similar characteristics with TRA but also contains distinct traits (Davis, 1989). The construct 'intention to use' included in TAM is derived from the TRA model (Davis et al., 1989). As in the TRA, the TAM treats intention to use and actual use as separate entities, with actual use being determined by intention to use (Ibid). The use of this model therefore gives researchers the opportunity to examine both constructs in relation to adoption behaviour, in order to determine whether there is a relationship between them. This contrasts with the TRA model, which proposes that intention to use results in actual use (Taylor & Todd, 2001). The factors that are theorised to impact intention to use also differ between the two models. In TRA, there is a direct relationship between attitude and intention to use, and behaviour, while in TAM, this relationship is between perceived usefulness and intention to use. This is explained by Davis (1989) by saying that in IT adoption environments, whether or not a user intends to use a particular technology is determined by their perception of how useful it will be and its capability to help them with a task, regardless of their attitude towards the technology. One of the significant differences between TAM and the earlier TRA and TPB is that the subjective norm construct is not present. Davies (1989) again provides an explanation for this by stating that this construct is not

appropriate for empirical research because it has a context-sensitive nature and there is no concrete evidence demonstrating a significant relationship between the subjective norm and intention to use. As Davis (1989) points out, social factors can still be included in the TAM model as external variables and investigations can still be conducted into whether they impact other constructs.

Davis et al. (1989) explain that by including external variables when investigating user intention to adopt technology, researchers can also examine the impact of other influential variables that are not directly incorporated into the TAM. These may be factors such as demographic, social and personal factors, or trust, system characteristics or personality traits (Gefen & Straub, 1997; Venkatesh, 2000). This flexibility is one of the characteristics that differentiates TAM from the former models (Taylor & Todd, 2001). Taylor and Todd (2001) also assert that this is one of the pragmatic advantages of TAM, as it makes it better able to predict the intention to use. TAM's versatility means that it is considered by several scholars to be a comprehensive and influential tool for gaining an understanding of user adoption of information technology (Hartwick & Barki, 1994; Mathieson et al., 2001; Taylor & Todd, 1995).

The model by Davis is considered by other scholars to be parsimonious (Karahanna and Straub 1999) and easy to use and comprehend (Taylor and Todd, 1995). Other studies have provided empirical evidence for the exploratory power of TAM, as it can account for more than 40 percent of the variance in intention to use technology (Featherman and Fuller, 2002; Venkatesh et al., 2003).

On the other hand, others have highlighted several limitations of TAM, such as the fact that it focuses on only two attitudinal antecedents. This reduces its richness and generalisability and means that it lacks practical design guidance (Taylor and Todd, 1995; Plouffe et al., 2001). Koufaris (2002) has confirmed that when used to model and explain online consumer behaviour, a model is required that has more complex and richer constructs than TAM can offer. In spite of the above limitations, The TAM model has been used empirically by the majority of mobile commerce studies. Recent examples include: Muñoz-Leiva *et al*. (2017), Bailey *et al.* (2017); the discussion of these two studies is in section 2.5.

2.6.4 The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT was established by Venkatesh *et al.* (2003). The originality of this model came from the way that the authors compiled and compared the existing models that had previously dominated technology acceptance behaviour studies. There are five main components of the UTAUT model: three constructs that are thought to indirectly influence behaviour intention (BI) (performance expectancy (PE), effort expectancy (EE) and social influence (SI)) and two that are believed to directly affect behaviour intention (intention to use and facilitating conditions (FC)). In the UTAUT model, behaviour is also seen to be moderated by four factors: gender, age, experience and voluntariness of use. The relationships between these constructs are theorised to be as follows: (1) the relationship between PE and BI is moderated by gender and age; (2) the relationship between EE and BI is moderated by gender, age and experience;

(3) the relationship between SI and BI is moderated by gender, age, experience and voluntariness; and (4) the relationship between FC and BI is moderated by age and experience (Venkatesh *et al.*, 2003). Figure 3 presents the UTAUT.

It is proposed by Ventatesh et al. (2003) that the UTAUT is a better theory because it can be used to explain 70% of the variance in adoption behaviour, compared to earlier theories that were able to explain only 30-40% of this variance. Others criticise it for being too complicated (Casey & Wilson-Evered 2012; Van Raaij & Schapers 2008). In addition, it should be noted that most of the relations in the UTUAT are moderated. Bagozzi (2007) agrees that UTAUT is powerful because of its parsimonious structure and high explanatory power but it is criticised for not taking into account any direct effects that might uncover new relationships.

The main common elements between the UTUAT and TAM models is that they both measure how easy to use and useful technology is for the user. Performance expectancy refers to "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al. 2003). It is therefore similar to the construct of perceived usefulness in TAM. Effort expectancy refers to "the degree of ease associated with the use of the system" (Ibid). It is therefore similar to the construct of perceived ease of use in TAM. It is essential to include both of these constructs in any investigation of technology adoption. Shaikh and Karjaluoto (2015) conducted a review based on 55 publications pertaining to mobile banking adoption. They found that the two most common antecedents utilised in examinations of the adoption of mobile banking were perceived ease of use and

perceived usefulness. Thus, this study will consider these two elements in the investigated research model.

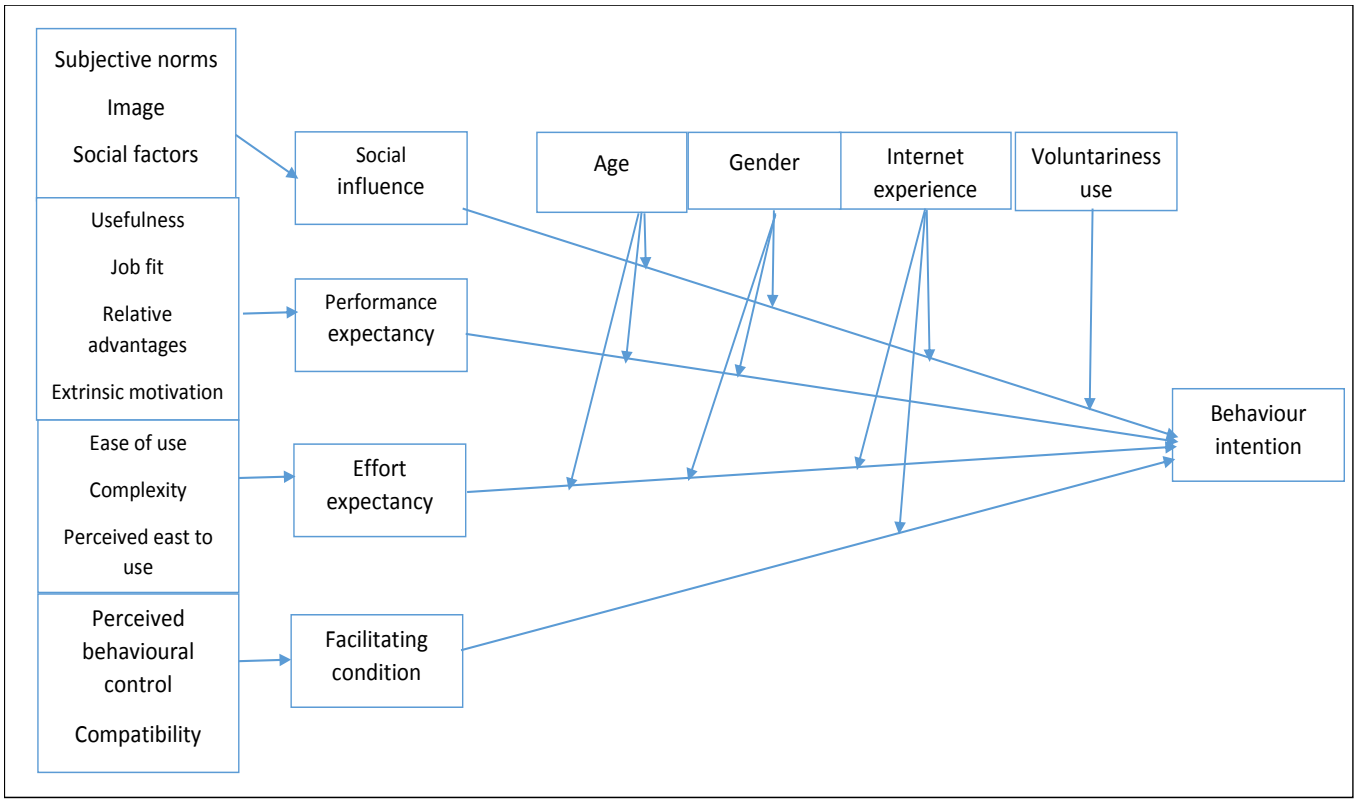

Figure 4: The Unified Theory of Acceptance and Use of Technology (UTAUT) Venkatesh *et al.* (2003).

2.6.5 IS success model

In information systems, one of the core assessments of any technology is the quality dimensions. These dimensions were proposed and tested in the IS success model. This model was developed by DeLone and McLean (1992) to illustrate the factors that affect information system success. The factors, as depicted in Figure 5, are identified as information quality and system quality; these variables affect the use of the information system and user satisfaction, while individual impact affects the organisational impact.

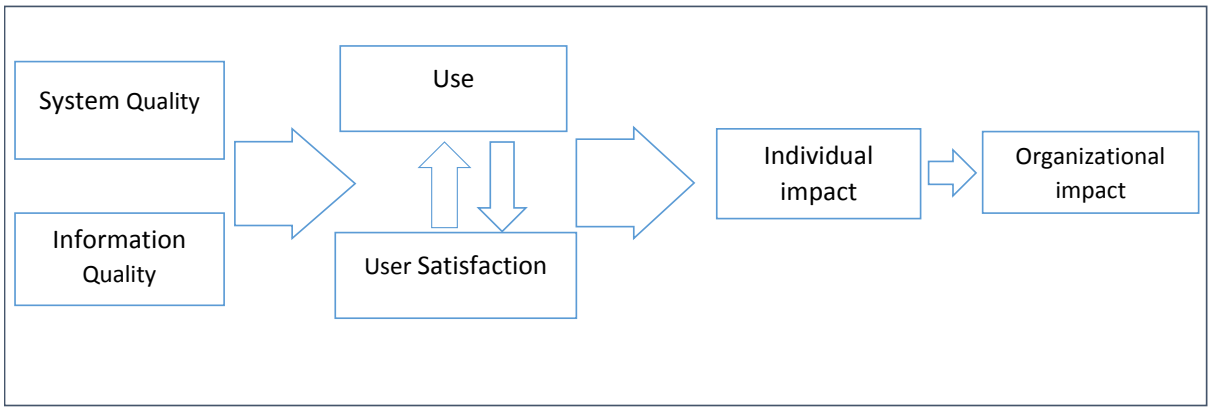

Figure 5: DeLone and McLean (1992)

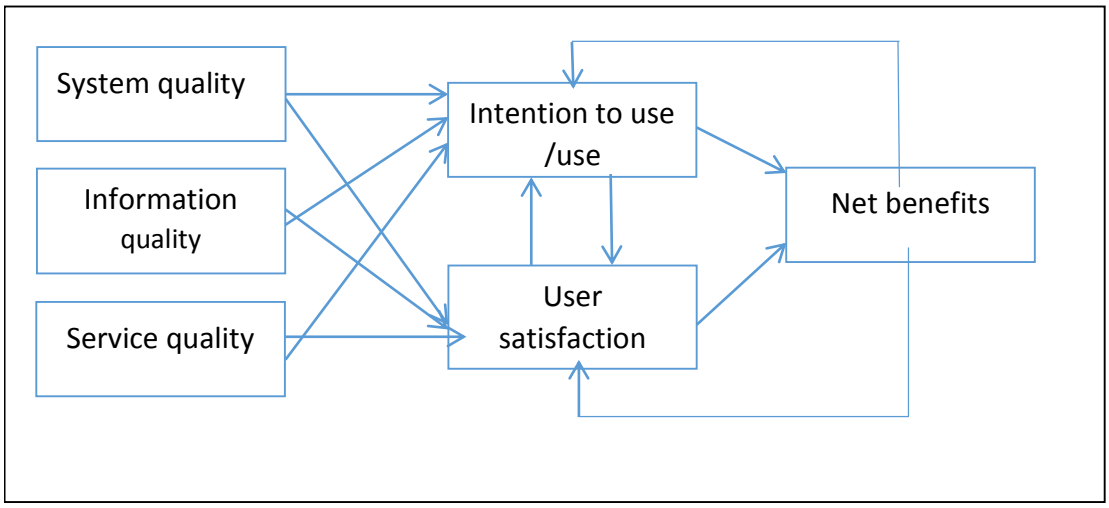

Figure 6: DeLone and McLean updated model (2003).

The model was updated in 2003 with the addition of the service quality factor, as illustrated in Figure 6. System quality and information quality are said to be the most important factors in testing what a single system has achieved (DeLone and McLean, 2003).

There are a number of elements reflected in system quality: ease of use, response time, user interface, and reliability and stability (DeLone and McLean, 1992; Petter *et al*., 2008; Sharma *et al.*, 2017; Wu and Wang, 2006; Zhou, 2013). If these features are not present, users may doubt the service provider's ability to provide a quality service as the users' experience will be negatively affected, as will their intention to continue utilising m-banking. Service quality is traditionally defined as "the quality of the support which is received by the users from the IS department and IT support system" (Chatterjee *et al*, 2018; DeLone and McLean, 2003). High service quality denotes delivering technology to customers with high levels of security/privacy, usefulness, design/aesthetics, pleasure and sociality (Arcand *et al*., 2017; Shareef *et al* 2014). Information quality refers to how accurate, timely, relevant and sufficient the information is .According to Sharma and Sharma (2019), this characteristic is a key determinant of users' attitudes towards technology. Information quality is therefore considered to be the main construct; it has an impact on a number of behavioural beliefs that are associated with the intention to use mobile banking (Wixom and Todd, 2005). Zhou (2013) highlighted the fact that if information quality is poor, users will need to make a lot of effort to dissect information, which will increase their operational difficulty. Gao and Bai (2014) also affirmed that poor information quality will decrease users' satisfaction as their expectation of a high-quality service will be disappointed.

By reviewing the literature of mobile banking, it was noticed that the quality dimensions had not received much attention from researchers. This was pointed out by Shaikh and Karjaluoto (2015). They found that within mobile banking studies, information quality was examined four times, system quality

five times and service quality twice. Disregarding these elements can be considered a limitation of mobile banking studies.

2.7 Previous studies on trust on online transactions

As previously mentioned, studies in different disciplines, including economics, technology and management, have examined trust. Trust has been identified as the principal catalyst of many types of transactions, particularly online transactions where the lack of physical contact leads to uncertainty. According to Kim *et al.* (2008), trust plays a particularly important role in online transactions, because they are, among other things, borderless and blind. In traditional business transactions, trust is centred on a face-to-face relationship, but with online transactions, the focus is much more on the actual transaction (Ibid). Creating an environment that consumers trust is therefore essential for the success of online businesses.

Trust is particularly important in online transactions because the lack of face-to-face interaction makes it very impersonal, and consumers worry about the ambiguity of identities and items (Yousafzai *et al.*, 2003, Kim *et al.*, 2008, Gefen *et al.*, 2003). Consumers only buy items online if they are confident that the goods will be delivered as expected, and that these will be of high quality. Thus, this section will present the most cited studies conducted in the online environment such as e-commerce, m-commerce, m-shopping and mobile payment.

Through the development of m-commerce and e-commerce, several studies have been carried out on the importance of trust. The overall aim of these studies is to determine the role of trust in the customers' intention to use or loyalty or users' stratification as a dependent variable. For example, in Taiwan, Lin and Wang (2006) collected 255 completed questionnaires from m-commerce users and analysed the data with Structural Modelling Techniques. Their findings revealed that customer loyalty was affected by trust in this context, and that trust, loyalty and perceived value contribute to customer satisfaction. Research conducted by Al-Somali *et al.* (2009) in Saudi Arabia aimed to uncover factors that influenced the adoption of online banking. These were trust and other factors such as the quality of the internet connection, the awareness of online banking, the social influence and computer self-efficacy acceptance. Education and resistance to change were integrated with the TAM. A survey was distributed randomly in the Saudi community and 400 surveys were returned. Trust was shown to have a significant impact on intention to use online banking in Saudi Arabia. Also, Gao *et al.* (2015) integrated an information success model, flow theory and trust, in order to gain an understanding of the factors that influence the intention to buy through mobile devices. SEM was employed to analyse data collected from 462 individuals who had made purchases on mobile devices. It was found that concerns over security, privacy and information quality are the principal factors influencing trust. Flow is affected by trust, but flow influences satisfaction. All of these three factors combine to influence individuals' intensions to purchase items using mobile devices, and trust was shown to have a significant effect on the intention to use.

Thus, it is vital to examine the impact of trust on customers' intention to use mobile banking smartphone application.

However, researchers in online studies have examined trust with two different types of measurements. The first one is measuring trust as a single variable which it can be affected by other variables. For example, in a study by Li and Yeh (2010), the focus was on design aesthetics. Their hypothesis was that website characteristics were important for the development of trust in internet services. This was tested with SEM techniques. Their results confirmed that the design aesthetics of website characteristics were important, as they affected ease of use, perceived usefulness and customisation. Similarly, in Saudi Arabia, Al-Gahtani (2011) reported that for websites there was a positive correlation between trust and perceived usefulness, and between trust and perceived ease of use. This finding was based on a sample of 128 faculty members working or studying in a major Saudi university.

A new model for social commerce was developed by Hajli (2015), drawing on ideas from previous studies on information systems and marketing. The study was conducted in the UK. A total of 243 surveys were valid to test. PLS-SEM methodology was employed to test the model. The study found that social commerce constructs are used by consumers for online activities, and that this leads to increased levels of trust and increased intention to buy. In the context of m-payment systems, Gao and Waechter (2017) proposed a theoretical model for trust in m-payment systems and then applied this model to 851 questionnaire responses from potential users of m-payment systems in Australia. The analysis employed least squares SEM and the authors reported

that the process of formulating trust is positively correlated with the perceived quality of the system and service and the perceived quality of information. The formation of initial trust is negatively impacted by perceived uncertainty.

The second measurement of trust is trust as multi-dimensional or trust of different types and these types should be considered when measuring customers' trust. The argument is that trust types may have a considerable effect on overall trust within e-commerce. For example, in the context of e-commerce, a study by Gefen (2000) explored how familiarity with vendor and disposition to trust as trust types can influence consumers' willingness to buy books online. Both the intention to enquire and the intention to buy were affected by trust and familiarity with the online vendor. The study was done by asking 217 students to buy from Amazon.com then to fill in a survey based on their experience with this website. In another important study, McKnight *et al.* (2002) suggested a trust model to measure customers' behaviour with regard to trusting web-based transactions. They argued that trust is a multi-dimensional construct, which means that overall trust consists of different types of trust. In addition, each type of trust has different implications for consumer behaviour. Therefore, they combined two types of trust: disposition to trust and institution-based trust, which consists of structural assurance and situational normality. Empirically, they found that the trust dimensions significantly affect trust beliefs and therefore trust intention. However, it should be noted that McKnight et al. (2002) study focused on the customers' initial trust. In addition, they built their trust model in the light of the TRA theory in terms of measuring behavioural intentions. Figure 7 demonstrates the McKnight *et al.* (2002) model.

Nevertheless Gefen *et al.* (2003) established a new trust model in the light of McKnight *et al*. (2002) model. Gefen *et al*. (2003) model combined adoption variables with the four types of trust: familiarity with vendor, calculative-based trust, structural assurance and situational normality. The aim of their model is to find out the role of trust in customers' intention to use an online bookshop. The result found that all the trust types except familiarity with the vendor have a significant relationship with trust. This is due to the poor loading for some of the familiarity of vendor measurements. Figure 8 presents Gefen *et al*. (2003) model.

Although the above two trust models have some similarities in terms of sharing some trust types and research contexts, there are some important distinctions. First, as stated earlier, McKnight *et al*. (2002) model was built with TRA theory whereas Gefen *et al.* (2003) integrated the TAM model with trust dimensions. Second, even though the two models define trust as "a set of specific beliefs", McKnight *et al*. (2002) model examined initial trust while Gefen *et al.* (2003) examined ongoing trust. As these trust types provide evidence that they are important to customer trust and intention to use, it is critical to identify trust as multi-dimensional in mobile banking. Table 4 summarises the studies that examine the importance of trust in online transactions.

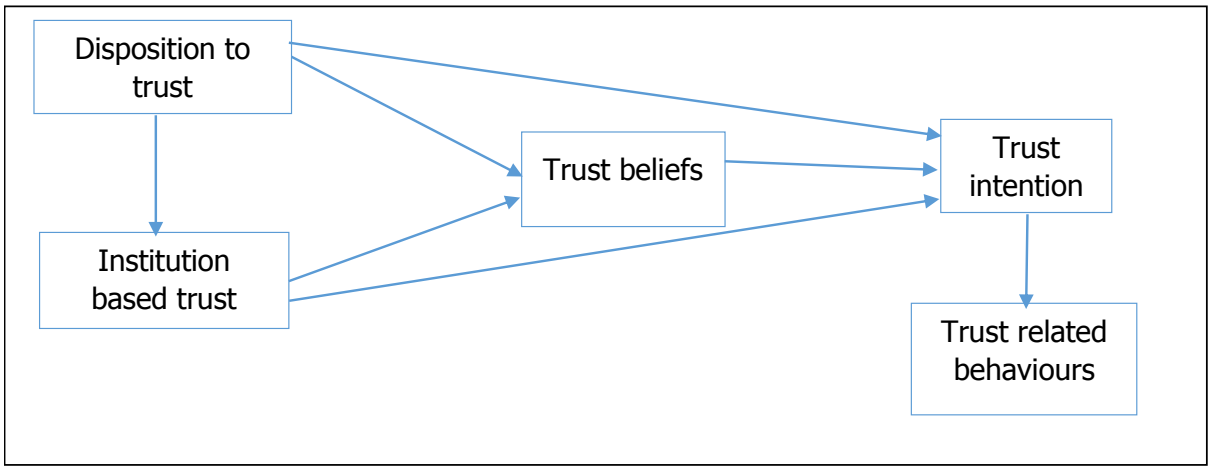

Figure 7: McKnight *et al*. (2002) model.

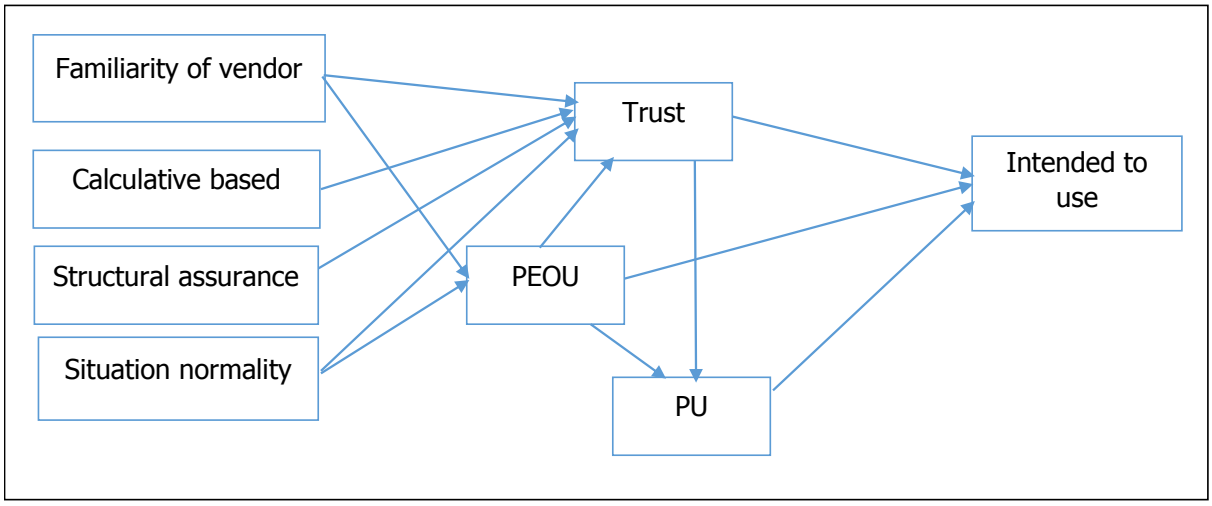

Figure 8: Gefen *et al*. (2003)model.

Author (s)	Technology examined	Country	Methods	Trust measurement	Findings
Hajli (2015)	Social media commerce	UK	Questionnaires.	single	Social commerce constructs lead to increased levels of trust and increased intention to buy.
Gao *et al.* (2015)	Mobile shopping	Australia	Questionnaires.	single	Trust in mobile shopping services is mainly influenced by the quality of information and privacy and security concerns. Trust and service quality influence flow, and flow affects satisfaction. System quality and privacy and security concerns have an impact on satisfaction.
Gao and Waechter (2017)	Mobile payment systems	Australia	Questionnaires.	multi-dimensional	Initial trust is impacted by a number of different factors, such as perceived system and information quality. Trust is also affected by perceived service quality, but perceived asset specificity has no significant effect. Initial trust is negatively influenced by perceived uncertainty.
Mortazavi *et al.* (2014)	Online purchase	Iran	Questionnaires.	multi-dimensional	Flow experience and trust are influenced by VSN attributes. Flow experience is also affected by trust in a VSN environment. The level of trust of a user is influenced by their level of education.
Al-Gahtani (2011)	Electronic transactions	Saudi Arabia	Questionnaires.	single	There is a positive relationship between trust and perceived usefulness and between trust and perceived ease of use.
Li and Yeh (2010)	M- commerce	Taiwan	Questionnaires.	single	There is a significant relationship between design aesthetics and website characteristics. Trust is significantly affected by perceived usefulness and ease of use.
Lin and Wang (2006)	Mobile commerce	Taiwan	Questionnaires.	single	Customer loyalty is significantly affected by trust, perceived value, habit, and customer satisfaction.

Koufaris and Hampton-Sosa (2004)	Online Company	U.S	Questionnaires.	single	Trust is significantly impacted by perceived company reputation, as well as the vendor's willingness to customise products and services. Other important antecedents of initial trust were found to be security control, the perceived usefulness of the website and ease of use.
McKnight *et al.* (2002)	Electronic commerce	U.S	Questionnaires.	multi-dimensional	E-consumers' trust is significantly affected by perceived trust, structural assurance, and the perceived reputation of the vendor.
Gefen (2000)	E- commerce	U.S	Questionnaires.	multi-dimensional	The intention to enquire and the intention to buy books online are affected by trust and familiarity with the vendor.

Table 4: Studies on the important of trust in online transactions.

2.8 Studies on trust in online banking and mobile banking

Trust is regarded as the prime catalyst for numerous transactions, particularly with online banking systems. The importance of trust in m-banking and e-banking has received much attention in the literature. However, it is clear that the view of trust as single or multi-dimensional has shed light on customer trust studies on online and mobile banking. Therefore, this section will demonstrate the studies that present trust as either single or multi-dimensional in online banking and mobile banking as well as the method used to examine trust in order to shape the gap for this research.

There is clear evidence for the role of trust in users' decisions to adopt online or mobile banking. In some studies, trust is examined as a single dimension that affects user intention towards online or mobile banking. For example, in the online banking context, research conducted by Benamati *et al.* (2006) highlights the effect of trust on the likelihood of using online banking services. Questionnaires were distributed to 500 students for data collection, and the results confirmed the significant correlation between trust and intention to use online banking, with distrust having a negative impact on intention to use internet banking services. A Saudi study conducted by Al-Somali *et al.* (2009) used questionnaires to evaluate which factors improve the use of internet banking systems. It was apparent that attitudes towards using online banking were affected by trust. Partial least squares analysis was used in the study, and revealed that use of online banking is significantly affected by social influence, computer self-efficacy, and the role of online banking. In the mobile banking context, Alalwan *et al.* (2017) formulated a study with 343 questionnaire

respondents. The aim of the study was to investigate the factors influencing behavioural intention and the adoption of mobile banking. The UTAUT2 constructs were included in their study models alongside trust. Trust was found to be highly significant for Jordanians' use. Lin *et al.* (2014) combined three theories in order to create a theoretical model to evaluate how trust can change over time. These three theories were: the self-perception theory, the extended valence theory and the information systems expectation confirmation theory. The authors analysed longitudinal data collected from 332 mobile banking users in China by SEM, and it was found that pre-use trust affects usage behaviour and that post-use trust is increased by satisfaction. In Iran, the factors that influenced customers' acceptance of mobile banking were examined by Hanafizadeh *et al.* (2014). The study involved eight variables such as ease of use, usefulness, trust, credibility, need for personal interaction, risk and compatibility with lifestyle; these were examined regarding the intention to use mobile banking amongst Iranian users. The sample comprised 361 students and the data was collected by a survey. The authors reported that trust was the most influential factor with regard to the use of mobile banking.

On the other hand, a limited number of studies have considered trust as multi-dimensional, although some of these have investigated the trust types within initial trust. For instance, in a study carried out by Zhou (2012b), 240 surveys were collected in China in order to determine the role of initial trust in customers using mobile banking. The findings showed that initial trust is significantly affected by service quality, information quality, structural assurance, system quality and reputation. The factors affecting how mobile

banking users first form trust and intention to use the service were tested in Korea by Kim *et al.* (2009). The study gathered 206 questionnaires from non-users of mobile banking and then analysed them with SEM. Aspects shown to affect initial trust and usage intention towards online banking include the firm's reputation, the user's personal propensity to trust, relative benefits, and structural assurances. Again, SEM was used to determine that structural assurances, propensity to trust and relative benefits impact initial trust to a significant degree. In addition, intention to use online banking is strongly affected by the perception of initial trust. Sun *et al.* (2017) also examined the factors that affect initial trust in mobile banking by collecting 424 questionnaires, and their results confirmed that structural assurance was the most important factor for building good levels of trust. By using an experimental study, the role of trust was tested in the context of e-banking by Yousafzai *et al.* (2005), and the results showed that the most appropriate way of building trust is for banks to utilise a specific set of strategies. The result showed that structural assurance and situational normality are the factors that play a major role in customers' perceptions of trustworthiness. In spite of the above studies examining the effect of trust dimensions on initial trust, there is a need to investigate these dimensions in ongoing trust. Thus, research has been carried out on the types of trust in ongoing trust in banking systems.

However, in the mobile banking context, it was found that trust types were investigated infrequently and that mobile banking smartphone application have not been examined with trust types. For example, a recent study by Singh and Srivastava (2018) reported that although intention to use mobile banking is not affected by trust, trust is significantly affected by the security mechanisms

provided by the mobile banking provider. Additional results identified four factors that influence customers' intention to use mobile banking: perceived ease of use, computer self-efficacy, perceived financial cost and security. Moreover, in order to obtain a deeper understanding of the factors leading to the adoption of mobile banking in China, a theoretical model was developed by Liu *et al.* (2009). The model was based on the TAM and incorporated the factors of trust. The role of trust was studied from numerous perspectives. After they collected 438 surveys, the findings demonstrated that trust has an impact on intention to use. In addition, trust in mobile banking service tends to be influenced by three factors, namely trust in technologies, trust in vendors, and structural assurance. However, the above study overlooked the other trust types such as familiarity with vendor and calculative-based trust.

Therefore, trust as a holistic view was at the centre of the study by Wang *et al.* (2015) in Taiwan. The researchers examined the relationship between people's disposition to trust and trust antecedents such as familiarity with vendor, calculative-based trust and institution-based trust, and people's level of trust in mobile banking systems. After analysis of 830 valid surveys, it was found that there was an important correlation between these three factors. In addition, structural assurance was the most influential variable. They also explored how intention to use mobile banking was affected by trust, and reported that its influence was significant. However, this study failed to address the different types of mobile banking as it took mobile banking in general as the research context. In addition, it limited its model to trust types without considering any other variables such as usability variables. Thus, Gu *et al.* (2009) used SEM to investigate the factors that have an effect on customers' intention to use mobile

banking. They combined TAM variables with trust type. The findings of this study back up the framework model's validity – the variance in intention to use was 72.2%. The main factor affecting trust was shown to be structural assurance, and the authors state that trust has a significant impact on behavioural intention. Trust, perceived ease of use, and perceived usefulness are all factors affecting behavioural intention towards mobile banking. It was noted that these studies on mobile banking were conducted on mobile banking in general, not a particular type such as through a banking app. Thus, there is an urgent need to address the topic of trust types for users of banking app.

Moreover, researchers should not ignore the importance of identifying the variables that have an impact on trust in customers who use bank app. For example, a model was developed by Vatanasombut *et al.* (2008) to extend the commitment-trust theory as well as technology acceptance in order to reveal the factors that impact intention to use internet banking. It was found that the commitment and trust factors affect intention to use; in addition, communication, security and share value are the main trust antecedents. In Brazil, the factors affecting trust in mobile banking were examined by Malaquias and Hwang (2016). A large sample of 1077 participants completed a questionnaire and the data was analysed with CFA and SEM. The authors concluded that trust was influenced by many different factors such as type of study courses, age, gender, social influence, personal innovativeness, task characteristics and risk perception. One of the main weakness in Malaquias and Hwang (2016) study is not considering the characteristics of the examined technology such as information quality and usability variables. Conversely, using DeLone and McLean's model as a basis, a further model was created by Lee

and Chung (2009) to investigate the ways in which system quality, information quality, and interface design quality affect trust and satisfaction. Structural equation modelling of 376 questionnaires collected from mobile banking customers revealed that customers' trust in internet banking is significantly affected by both information and system quality, while interface design quality is not an influencing factor on satisfaction or trust. Furthermore, the findings indicate that there is a positive relationship between satisfaction and trust. However, Lee and Chung (2009) made no attempet to investigate usability factors such as ease of use and usefulness. Thus, to determine the importance of these variables and to examine information quality in trust, it would be more interesting to validate these varabiles with trust types in banking app.

Furthermore, most of these studies on trust in online and mobile banking employed quantitative research methods. To understand theoretical models in mobile banking, more empirical data are needed, mainly qualitative data in term of gathering insight (Shaikh and Karjaluoto, 2015). Nonetheless, most of the studies adopt quantitative research. For example, in order to investigate the issue of acceptance of internet banking, an updated model of technology acceptance was developed by Hussain Chandio *et al.* (2013). The model was tested empirically by gathering information from 353 internet banking customers from Pakistan. Structural equation modelling was applied using the Analysis of Moment Structures program, and the results supported the extended model. It was found that 45.7% of the variance in intended acceptance behaviour was explained by the following factors, in order of importance: perceived usefulness, perceived ease of use and trust. Moreover,

21.8% of the variance in perceived usefulness was explained by trust and technological self-efficacy. Trust was found to be the most significant factor for intention to use online banking in Jordan, in a study by Alalwan *et al.* (2014). Also, the study considered other factors such as performance expectancy, hedonic motivation, risk and facilitating conditions. The data was collected from 348 users of online banking, then the data was analysed with SEM. Sharma *et al.* (2017) conducted a study by integrating social influence, trust and compatibility along with demographic variables into the original TAM. Their study aimed to understand customer behaviour in mobile banking. 208 Omani users were surveyed by online survey and the data was analysed by two-stage regression and a neural network (NN) model. The result shows that trust, perceived usefulness, compatibility and social influence are significant in the regression model; these factors were also allocated high relative importance by the NN model.

Table 5 summarises the studies on trust within online and mobile banking by highlighting their method, trust measurement and research contexts. As shown in Table 5, most of these studies failed to gather the data from different sources and most of them depended on an online survey or questionnaire.

To summarise, from the above literature on customers' trust in mobile banking it is clear that trust is important for the use of mobile banking. Although trust was only studied as a single variable and only a few studies have paid attention to the dimensions of trust, such as Gu *et al.* (2009) and Wang *et al.* (2015), still the holistic view of trust and trust dimensions has not been investigated sufficiently in a specific type of mobile banking. Moreover, there are limitations

in terms of the data collection tools used in studies on the issues surrounding trust in mobile banking. Most of the studies utilised the survey method, which indeed ignored the in-depth perceptions of customers regarding the use of and trust in mobile banking. In addition, the contexts of most of the above studies on customers' trust were mobile banking in general. However, if customers use different mobile banking services, their experience may lead to different trust perceptions. Ultimately, there remains a lack of understanding of the trust mechanism in mobile banking, and how this could be developed to enhance the use of mobile banking services.

This research therefore intends to fill the above research gap by investigating in depth the dimensions of trust that affect overall customer trust in bank app. Integrating the dimensions of trust that have been validated in the literature into a single piece of research may enable the researcher to easily identify the important types of trust that formulate customers' overall trust in mobile banking. Moreover, combined adoptions variables and their effect on customer's trust possibly will articulated the important of these elements to customer trust. In addition, generating data by different methods will help to understand the importance of trust and trust dimensions. Also, taking a particular type of mobile banking to examine trust's dimensions as a research context will help to gain a deep understanding of customers' trust in that mobile banking type.

Author (s)	Technology examined	Country	Methods	Trust measurement	Findings
Singh and Srivastava (2018)	Mobile banking in general	India	Questionnaires	Multi-dimensional	The security mechanisms provided by mobile banking services increase consumer trust
Alalwan *et al.* (2017)	Mobile banking in general	Jordan	Questionnaires	Single	Use of mobile banking is mainly influenced by trust
Sharma *et al.* (2017)	Mobile banking in general	Omani	Questionnaires	Single	Trust is important for users of mobile banking
Sun et al (2017).	Mobile banking through smartphone	china	Questionnaires	Multi-dimensional	Structural assurance has the most influence on trust
Malaquias and Hwang (2016)	Mobile banking in general	Brazil	Questionnaires	Single	The study reported that trust in mobile banking was affected by many different adoption factors.
Wang *et al.* (2015)	Mobile banking in general	Taiwan	Questionnaires	Multi-dimensional	There was a significant relationship between disposition to trust, antecedents of trust, and trust. The intention to use mobile banking was heavily mediated by trust.
Lin *et al.* (2014)	Mobile banking	China	Questionnaires	Single	Post-use trust is increased by satisfaction. Pre-use trust directly and indirectly influences the use of mobile banking.
AlAlwan *et al.* (2014)	Online banking	Jordan	Questionnaires	Single	Trust was the most influential factor for intention to use online banking.
Hanafizadeh *et al.* (2014).	Mobile banking application	Iran	Questionnaires	Single	Trust was the most important factor influencing the use of mobile banking.

Chandio *et al.* (2013)	Internet banking	Pakistan	Questionnaires	Single	Almost half (45.7%) of variance in behaviour was explained by trust, perceived ease of use and perceived usefulness. 28.1% of the variance in perceived usefulness was explained by technological self-efficacy and trust.
Zhou (2012b)	Mobile banking	china	Questionnaires	Multi-dimensional	Trust in mobile banking was found to be influenced by a number of factors: the quality of service, information and systems, structural assurance and reputation.
Al-Somali *et al.* (2009)	Online banking	Saudi Arabia	Questionnaires	Single	Trust significantly influences attitude.
Lee and Chung (2009)	Mobile banking Internet-based	Korea	Questionnaires	Single	There is a significant relationship between trust and system quality, and also between trust and information quality. Trust and satisfaction are positively correlated.
Gu *et al.* (2009)	Mobile banking in general	Korea	Questionnaires	Multi-dimensional	Structural assurances have the most significant impact on trust, and they also influence behavioural intention for mobile services. The intention to use mobile banking services is significantly related to trust, perceived ease of use and perceived usefulness.
Vatanasombut *et al.*(2008)	Online banking	U.S	Questionnaires	Single	Intention to use online banking is mostly influenced by trust and relationship commitment. Trust plays a crucial role in intention to use.
Benamati *et al.* (2006)	Internet banking	U.S	Questionnaires	Single	Trust has a significant impact on intention to use internet banking. Intention to use is affected negatively by distrust.
Yousafzai *et al.* (2005)	Online banking	UK	Questionnaires	Multi-dimensional	The researchers recommend that a wide range of strategies should be used by banks build trust in their systems.

Table 5: Studies of trust in mobile banking and online banking

2.9 Studies on mobile banking technology adoption

Practitioners and scholars across the world have paid great attention in recent times to investigating and demonstrating the take-up of mobile banking and associated customer intentions, with an attendant acceleration in research on the various platforms of online banking and mobile banking (Cheng *et al.*, 2014, Gao *et al.*, 2015). The variety of approaches utilised and the range of theoretical foundations from which research has been based have enabled researchers to examine the ideas, attitudes, and intention to use of mobile banking customers.

This section will demonstrate the most cited studies in mobile banking and recent research on mobile banking. These studies focus on the adoption and use of mobile banking and the variables that affect customer use.

As stated above, several studies have been concerned with mobile banking adoption. However, it is clear that most studies take mobile banking in general as the starting point to examine customers' adoption. For example, Aboelmaged and Gebba (2013) have examined the use of mobile banking in the United Emirates by integrating the TAM and TPB. The data was collected from 199 users of mobile banking. The results indicate that usefulness has significance for customer use whereas ease of use was shown to be insignificant.

other studies have centred their investigations on a particular type of mobile banking. For example, internet-based mobile banking as the context of their research. However, the theories used in these studies were examined in quantitative empirical research. Hence, the explanations of some of their result

were not clear. For example, Zhou *et al.* (2010) set out to establish which elements had an impact on the aspects affecting mobile banking usage intention. Although their study is the most cited study in mobile banking since 2008, one of its major drawbacks is that the data was collected randomly and not from specific banks. They collected the data from users who had internet function on their mobile. In addition, there was no attempt to explain why effort expectancy has no effect on user intention. Although they used several quantitative analysis techniques such as partial least squares (PLS) and LISREL, their study would have been more interesting if they had used qualitative data to explain the results and enrich their research. The use of smart banking was the context of a study by Kim and Kang (2012), who focused on customers' intentions when using smart banking to carry out tasks such as checking accounts or carrying out transfers. The researchers found that usefulness, security risks and trust had an effect on users' intention to use mobile banking either for checking balances or transferring funds. However, ease of use has no effect on users intention to use mobile banking. The study showed that the number of individuals using the checking balance feature was greater than that for other transactions as a result of the positive effects attributed to usefulness and trust. One major limitation of this study was that it failed to define clearly the research context being examined, such as applications or browsing the bank's website with the smartphone internet page, as it was showed in their study that the data collected from smartphone banking and internet banking. This is fundamental as the presentation of these types of banking varies and indeed the perception of the user would be different. Another major drawback

of their study is that there was no attempt to explain the reason behind the non-significant result of ease of use.

Recently, Shareef *et al.* (2018) explored consumers' intention to use mobile banking by examining three stages of mobile banking: static, where the consumers are only able to check information like account balances; interaction, where there is two-way communication between customers and service providers; and transaction, where more sensitive operations can be carried out, such as transferring funds between accounts and paying bills. To do so, they observed the effect of several variables on customers' intention, such as perceived awareness, availability of resources, computer self-efficacy, ability to use, multilingual option, information quality, perceived trust, uncertainty, security and perceived image. However, the research does not take into account pre-existing usability variables such as ease of use and usefulness which are important for users to communicate with any system. Also, the study fails to fully define what the research context is, either mobile banking in general or a specific type. Therefore, it is important to identify a specific type of mobile banking as each type has different services, presentations and characteristics.

Although a number of studies have examined users view on mobile banking, the new type of mobile banking conducted through a smartphone application has not been studied widely or extensively in the literature. While writing this thesis, some studies have taken smartphone applications as their research context. Thus, there is strong need to address this new type of mobile banking. For example, Priya *et al.* (2018) considered ease of use, usefulness, structural

assurance, user satisfaction, credibility and risk. After analysing 269 questionnaires distributed in India, the study found that nearly all of the studied variables were significant, with only perceived risk being statistically insignificant. Although the study takes into account the usability variables such as ease of use and usefulness, the information quality variable was overlooked. On the other hand, the TAM model in mobile banking application was the focus of Mehrad and Mohammadi (2017) study. They investigated factors that could affect the adoption of mobile banking in Iran by integrating the TAM model with three other variables: word of mouth, social norm and initial trust. They sampled 384 actual users and used SEM to analyse the data. The result shows that the word of mouth variable had the most influence on the attitude of users towards the use of mobile banking. This variable was also shown to have a positive impact on other factors affecting the adoption of mobile banking. However, the main weakness of the study is the failure to address in depth how and why these variables affect intention to use, as the study fully depends on a quantitative empirical approach. This research approach has a number of limitations, for example the responses to the questions have limited options; this may affect the result. Also, the quantitative empirical approach does not provide meaning or reasons for the examined hypotheses (Bernard and Bernard, 2012).

To sum up, in the mobile banking smartphone application era, the above studies prove the importance of TAM constructs such as ease of use and usefulness in mobile banking smartphone application. However, the information quality measurement of the application has been overlooked despite it being

essential for any stage of information systems, i.e. mobile banking (Shaikh and Karjaluoto, 2015). In addition, due to culture differences, there is a strong need to examine this new type of banking in a different country such as Saudi Arabia, as no research has yet been done in this country on this topic, although there is clear evidence that the highest number of users in mobile banking smartphone application is in Saudi Arabia (AVAYA, 2017).

Table 6 presents a summary of mobile banking studies that focus on the adoption and the use of mobile banking. From the table, although some of the above studies differed in term of the research context (type of mobile banking), it is clear that most of these share similar data collection methods. Questionnaires were the most commonly used method of investigating customers' adoption. More precisely, there have been no qualitative studies on the use of mobile banking. The studies on customers' adoption of mobile banking have failed to explore the insights of mobile banking customers as most of them have used online surveys. Moreover, it can be seen that the most frequently explored adoption factors were usefulness and ease of use. This shows how these variables are important to adopting technology in commerce. Furthermore, it appears that information quality has not been considered widely in mobile banking, although this variable is essential for the users (Shaikh and Karjaluoto, 2015). For these reasons, adoption variables such as information quality, ease of use and usefulness should be studied further. Additionally, since the views and experiences of customers can change over time, these factors must be examined regularly. Moreover, as these studies discount the value providing from qualitative data, there is a need to conduct an in-depth

investigation into customers' perceptions of the use of mobile banking. Moreover, most of these studies have acknowledgment the important of trust in using mobile banking, however, the trust dimensions are not considered yet in mobile banking application. Thus, there is a need to investigate the important of trust types in using mobile banking app.

Author	Theory and method	Method	Country	Mobile banking channels	Aim	Result
Zhou *et al.* (2010)	UTAUT	Questionnaires	China	Mobile banking internet -based	Determine the factors that influence intention to use mobile banking.	Relative advantages, trust, usability and social influence elements have a significant effect on users.
Kim and Kang (2012)	TAM.	Questionnaires	Korea	Smartphone banking	Study the effect of usefulness, ease of use, security risks and trust on customers' intentions to adopt smart banking.	Checking bank balance was the part of the application most commonly used, as it was effected by useful, trust, risk and security.
Mehrad and Mohammadi (2017)	Extended TAM	Questionnaires	Iran	Mobile banking application via smartphones	Investigate the use of mobile banking in Iran	Consumers' attitudes towards mobile banking were mainly affected by system compatibility. The factor 'Resistance' had a significant negative effect on usefulness and ease of use, while 'Perceived usefulness' mediated the relationship between ease of use and users' attitudes. Finally, perceived image moderated the relationships between usefulness and attitude, while self-efficacy had no significant effect
Priya *et al.*, (2018)	Theoretical model	Questionnaires	India	Mobile banking in general	Investigate the factors influencing young Indian consumers' mobile banking adoption	The study suggested that user satisfaction (US) and behavioural intention so use mobile banking are affected by perceived usefulness (PU), perceived ease of use (PEU),perceived credibility (PC) and structural assurance (SA). US was found to partially mediate the relationship between PU, PEU, PC and SA and BI to

						use the service. However, there was a statistically insignificant relationship between perceived risk and BI to use mobile banking.
Shareef *et al.* (2018)	Theoretical model	Questionnaires	Bangladesh	Mobile banking in general	Explore consumers' behavioural intentions to adopt mobile banking at each of the 3 service stages	The study found that at each of the stages of mobile banking services, the factors influencing consumers' behavioural intentions to adopt mobile banking are significantly different

Table 6: Previous Studies on mobile banking technology adoption**.**

2.10 Insights into Saudi Arabia

There are four principal cities in Saudi Arabia, namely Riyadh, Jeddah, Mecca and Medina, and the population of each exceeds one million. Riyadh, which is the capital, occupies the greatest area, and is a well-developed city, its world-class infrastructure being inclusive of King Khalid International Airport with its global connections. Moreover, the most cosmopolitan city is Jeddah, the gateway through which pilgrims travel to Mecca (General Authority for statistics, 2017), whereas Mecca and Medina are considered to be the most holy cities. Furthermore, Medina is the summer capital, being home to the port hub in Dammam. It also contains the refinery and petroleum production as well as other oil organisations, and it is the location of King Fahd University. There are other smaller, yet important cities in Saudi Arabia such as: Abha, Al-Khobar, Buraydah, Hafr Al-Batin, Hail, Jubayl, Tabouk, Taif and Yanbu (General Authority for statistics, 2017).

People

The last report produced by the Saudi statistics authority was in 2016, and it indicated that the total population was 32,552,336 (General Authority for statistics, 2017). Out of this, 57.48% were male and 42.525% were female. The actual Saudi population is 20,408,362 which equates to 62% of the total population. Nearly 40% are foreign non-Saudi workers from various nations. Approximately 3% of the populace are over the age of 65, while 68.2% are in the 15 to 65 age group, with 24.8% being under the age of 15 (General

Authority for statistics, 2017). About 10% of the native populace are of Afro-Asian extraction as a result of the historical inflows into the area. Nevertheless, for religious reasons, some pilgrims remain in the country.

Total Females Males Total Females Males Total Females

Age	Male	Female	Total
14 and less	3,932,464	3,931,353	7,864,928
15-19	2,213,490	1,082,570	2,213,490
20 - 24	2,468,949	1,154,388	2,468,949
25-29	3,028,078	1,358,320	3,028,078
30-34	3,058,516	1,266,139	3,058,516
35-39	3,394,087	1,274,752	3,394,087
40-44	3,032,782	1,105,747	3,032,782
45-49	2,257,275	772,493	2,257,275
50-54	1,579,643	505,517	1,579,643
55-59	1,093,790	372,792	1,093,790
60 and above	647,884	647,190	1,295,769

Table 7: Saudi Arabia Population General Authority for Statistics (2016)

2.11 Overview of the banking sector in Saudi Arabia

2.11.1 Saudi Arabian Monetary Agency SAMA (the Central Bank)

The Saudi Arabian Monetary Agency (SAMA) was established in 1952. It is the head of the Saudi Arabian financial system (Saudi Arabian Monetary Agency, 2018b). Its principal aim is to act in the capacity of a regulator and as the government's bank. It also introduced legislation at the beginning of the 1960s that had the aim of developing the banking industry in the kingdom (Saudi Arabian Monetary Agency, 2018a). All financial activities are controlled by SAMA, which functions as a central bank. In addition, SAMA and commercial banks are heavily involved in the technology used in banking in Saudi Arabia, such as Automated Teller Machines (ATMs), electronic clearing, electronic fund transfers and stock trading (Ibid).

Saudi Arabia has 11 private commercial banks, which provide all financial services and are the primary providers in this sector. Since 2000 there has been a rapid increase in lending, and this has been the main source of bank earnings. Saudi Arabian Monetary Agency (2017)reported that consumer lending in 2016 was 4.5%, totalling SAR 352.8 billion. This boom in lending meant that banks in Saudi Arabia had a significant supply of high-yield and low-risk assets during a period when interest rates were declining (Alhudaithy, 2009). This increase in consumer lending was not due to the country's economic performance but to institutional and technological innovations (Ibid). Among these, the most important was the introduction of SARIE, an electronic payment system, which enabled the automation of salary payments in the public sector. This mechanism, and the security it offered, further enabled

individuals to secure loans from the banks (Alhudaithy, 2009). From 2004 onwards, the role of economic growth became more pronounced, increasing bank income and the value of local equities. This in turn led to a rapid rise in brokerage fees and special commission income from margin lending (Abdullah *et al.*, 2006). In recent listings of the largest banks in the Middle East, Saudi Arabia's Al Rajhi Bank, Riyad and the Samba Bank are on the top ranks (Forbes, 2018).

2.11.2 Mobile and online banking in Saudi Arabia

In 1999, it became possible for the public to access internet services in the Kingdom of Saudi Arabia (Communications and Information Technology Commission, 2009). Around 35 firms in the kingdom currently possess a licence to provide internet services (Saudi Arabian Monetary Agency, 2018), and the country is recognised as being one of the fastest growing in this sector. It is predicted that the growth in internet usage will continue to increase, due to the strength of the Saudi economy and the fact that a large majority of the population (60%) are teenagers and young adults, who very quickly take on new technologies (Communications and Information Technology Commission, 2009).

As use of the internet has rapidly increased, so has the number of banks and organisations offering online services. The value of transactions conducted through e-commerce makes a significant contribution to the economy, recently estimated at US$ 4.3 million. In fact, Saudi Arabia was ranked first among Arab countries for e-commerce growth (Arab Advisor Group, 2014). This report also found that 14.26% of the Saudi population were conducting transactions

through e-commerce, amounting to over 3.5 million internet users. With these statistics, it is clear that the kingdom is an ideal market for regional e-commerce activities (Arab Advisor Group, 2014).

1990 saw the first introduction of electronic innovation in the banking sector in Saudi Arabia through the establishment of ATMs and point-of-sale networks (Saudi Arabian Monetary Agency, 2018). With ATMs, customers were able to transfer funds, withdraw cash and check their account balances. By 2006 the number of ATM transactions was 626,711,813 (Saudi Arabian Monetary Agency, 2018). The next significant innovation came in 2000, with the introduction of phone banking through an automated voice response system. With this, customers were able to make transfers between accounts, pay utility bills and check their balance.

A few years later, around the mid-2000s, further developments in technology encouraged eight Saudi Arabian banks to set up websites. On these websites, customers could access data about bank branches such as addresses, telephone and fax numbers, and locations of ATMs, as well as press releases and newsletters. The websites also provided opportunities for customers to provide feedback, and displayed information about financial markets, customer services, retail and corporate banking and treasury services. The first Saudi Arabian banks to offer internet banking were the National Commercial Bank (NCB) and Arab National Bank (ANB) in 2001. At present, online and mobile banking services are offered to all customers at Saudi Arabian banks. A wide variety of services are offered, according to a study of the websites of Saudi banks and mobile banking app. These range from basic offerings, such as

balance enquiries, financial transactions and paying bills, to more offerings like email, cheque ordering and SMS services. Table 8 offers a summary of the mobile banking services offered by Saudi banks. It can be seen from the table that there are a variety of services that banks apps offer such as access statement, transfer money, view promotion, investment services, payment of utility bills and government services, payment of bills, access ATMs, contact bank, set new password, view graphic images of financial activity, SMS and mail and credit card services.

Bank's app services

Saudi Banks	Access statement	Transfer money	View promotion	Investment services	Payment of utility bills and government services	Payment of bills	Access ATMs	Set new password	Contact bank	View graphic images of financial activity	SMS and mail	Credit card services	Access loans	Cheque book ordering
Al Rajhi Bank	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Banque Saudi Fransi	√	√			√	√	√	√	√		√	√		
The National Commercial Bank	√	√	√	√	√	√	√	√	√	√	√	√		
Arab National Bank	√	√		√	√	√	√	√	√	√	√	√	√	√
Riyad Bank	√	√	√	√	√	√	√	√	√	√	√	√	√	√
The Saudi British Bank	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Samba Financial Group	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Bank Al Jazira	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Saudi Investment Bank	√	√	√	√			√	√	√	√	√	√		√
Saudi Hollandi Bank	√	√			√	√	√	√	√	√	√	√	√	
Bank Albilad	√	√	√		√	√	√	√	√	√	√	√	√	√

Table 8: Saudi mobile banking services.

2.12 Chapter summary

The background on the development of smartphone and mobile commerce were reviewed at the beginning of this chapter. Also, this chapter illustrated the theoretical adoption model and the definitions of trust in online technology. In addition, this chapter has summarised the key studies on the adoption of mobile banking. Moreover, previous studies on trust within mobile commerce, mobile banking and internet banking were discussed. Finally, the financial sector and development of mobile banking in Saudi Arabia were presented. The next chapter will present the key variables that affect customers' trust in mobile banking. Also, the next chapter will establish the research framework and hypotheses.

Chapter 3. CONCEPTUAL FRAMEWORK

3.1 Chapter introduction

There are four main sections within this chapter. The dependent variable, the intention to use, is outlined in 3.2 section. The independent variables are referenced in the 3.3. section, trust and trust's dimensions are in subsections 3.3.1 and 3.3.2. Descriptions of the adoption variables – the elements that influence trust and use of mobile banking application – are also considered under subsection 3.3.3. The framework, hypotheses and variables of the research are elucidated in the 3.4 section, whilst 3.5 section provides the conclusions to the chapter.

3.2 The Dependent Variable

3.2.1 Intention to use

The original theoretical concept of the TAM has two variables measuring the perception of users: attitude and intention to use. However, Davis *et al.* (1989) undertook a piece of longitudinal research and observed that the power of the TAM is just as strong and is more parsimonious if the attitude construct is not included. A number of researchers, such as Hwang (2005), Kim *et al.* (2009) and Kim and Kang (2012), have since implemented the TAM without the attitude construct. They have discovered that the explanatory status of their models persisted in their strength. Similarly, it has been noted by some researchers that the actual use demonstrated by individuals can be connected

to their intentions to use (Fishbein & Ajzen, 1975; Davis, 1989). The positive relationship existing between intention to use and actual use is outlined comprehensively within the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and the Theory of Planned Behaviour (Ajzen, 1991). Studies following TRA and TAM regularly indicated a significant correlation between the two factors (Gumussoy and Calisir, 2009, Gillenson and Sherrell, 2002). Consequently, Cheng *et al.* (2006) suggest that it can theoretically be justified to apply intention to utilise as an ultimate dependent variable to scrutinise the acceptance of internet banking. Furthermore, much of the research undertaken in e-commerce, m-commerce, internet banking and mobile banking has utilised intention as a dependent variable rather than actual use when outlining how people behave in relation to these applications, for example Chiu *et al*. (2017), Muñoz-Leiva *et al*. (2017), Shareef *et al*. (2018). Therefore, this research plans to utilise intention to use mobile banking application as the dependent variable, and to omit actual use and attitude from the research framework.

3.3 The Independent variables

3.3.1 Trust

The research utilises Gefen's definition of trust as a form of particular beliefs comprising integrity, benevolence and competence. Pavlou (2003) suggests that there is a positive correlation between trust and intention to use the relevant system. Significant degrees of trust are connected with significant degrees of intention to use (Gefen *et al.*, 2003). Additionally, it has been noted by Gu *et al.* (2009) that consumers can be persuaded to attempt to use mobile banking in instances where they already possess a significant degree of trust in

the relevant bank. Consequently, intention to use mobile banking is influenced by the level of the customer's trust.

Zhou (2012a) reinforces the notion that a relationship exists between trust and willingness to use mobile banking. He indicates a highly significant connection between these two factors. Wang *et al.* (2015) find that when trust has been formed between the consumer and the vendor, there is a greater likelihood of a positive adoption of m-commerce services. Research recently undertaken by Jamshidi *et al.* (2018) in Iran reinforces the notion that trust has a positive impact on the willingness of customers to use mobile banking systems, although this relationship is less significant when compared with other variables utilised in Jamshidi's reserch. These include flow experiences, brand equity and individual mobility. Another empirical study evaluating the effect of trust on the acceptance of internet banking in Malaysia was carried out by Nor and Pearson (2008). A total of 1,164 questionnaires was collected and analysed using SEM. The results of the analysis revealed that there was a strong link between trust and attitudes towards online banking. On the other hand, Susanto *et al.* (2016) found that there is no relationship between trust and intention to use samartphone banking. They argue that because there is no face-to-face interaction in new technology, the effect of trust on continuing to use smartphone banking will not be siginficant unless the customer perceives a high level of satisfaction with the service. The results of the above studies lead to the following hypothesis:

H1: Intention to use mobile banking app will be positively influenced by trust in mobile banking app.

3.3.2 Trust dimensions

Research into the field of e-commerce has focused on two renowned trust models that recognise that trust is multi-dimensional. The first one was suggested by McKnight *et al.* (2002) and relates to institutional-based trust consistent with structural assurance and situational normality. Meanwhile, the second was outlined by Gefen *et al.* (2003) and suggests that the foundations of trust relate to two dimensions: calculative-based trust and familiarity with vendor, sometimes referred to as knowledge-based trust, in addition to structural assurance and situational normality which Gefen *et al.* (2003) adapted from McKnight *et al.* (2002). However, as stated in section 2.7, Gefen *et al.*'s (2003) model was applied to users who had previous experience with e-commerce, which means trust had already been built. Although McKnight *et al.*'s (2002) model was based on user initial trust, Gefen *et al.*'s (2003) model was an adaptation of McKnight *et al.*'s (2002) model.

Some studies on online trust re-formulated Gefen's model to examine customers' trust. For example, in e-commerce, Zhu *et al.* (2011) combined Gefen's model with risk to investigate users' purchase intentions. The model included the four trust types and TAM constructs: ease of use, usefulness, attitude and intention to use. By surveying 705 users and applying SEM, the result showed that all trust types and risk affect intention as well as usefulness and ease of use. In mobile banking, a few studies have considered Gefen's trust model, such as Gu *et al.* (2009) and Wang *et al.* (2015). Yet, Gu *et al.* (2009) considered the TAM model while Wang *et al.* (2015) were content with trust types. These studies will be discussed in more details in the next sections.

For the purpose of this research, and to examine ongoing trust and the importance of trust types with regard to customer trust, it was decided to encompass Gefen *et al.* (2003) and McKnight *et al.*'s (2002) trust models into this research framework.

Due to the limited number of studies examining the types of trust in one single study, the next sections will consider the dimensions of trust in e-commerce, m-commerce, e-banking and m-banking.

3.3.2.1 *Familiarity with the m-vendor (knowledge-based trust)*

A person can be said to have acquired familiarity once they have been exposed to something previously and had the chance to acquire further information based on this experience (Gu *et al.*, 2009). Previous transactions in which a positive result was achieved need to have occurred for an individual to have acquired familiarity with an m-vendor or to obtain what is referred to as knowledge-based trust. Individuals will have more trust in an e-vendor if they have more experiences of positive transactions with them (Gefen, 2000, Gefen, 2002). An individual's internet and mobile banking experience dictates their familiarity with mobile banking; the user's previous experience of interacting with the bank is also significant. Wang *et al.* (2015) suggested that familiarity-based trust is a significant aspect that influences the level of trust that a customer has in mobile banking. Rouibah *et al.* (2016) undertook a survey in Kuwait and suggested that overall customer trust in e-commerce is affected by familiarity with the m-vendor. However, Gu *et al.* (2009) found that familiarity is not significant for customer trust. They reflected that familiarity with vendor has two types: interaction-based familiarity and knowledge-based familiarity.

They reported that trust is affected by knowledge-based trust not by interaction-based familiarity.

The following hypothesis was developed based on the studies noted above.

H2: Customer trust in mobile banking app is directly affected by familiarity with the vendor.

3.3.2.2 *Calculative-based trust*

This dimension of trust originates from an economic viewpoint. It takes the stance that a customer scrutinises the benefits and weaknesses of the relationship, suggesting that the user will only be willing to utilise technology if they believe that the m-vendors would not accrue benefit from being vague or lying to their consumers (Gefen *et al.*, 2003). This concept is also relevant when individuals are contemplating mobile banking (Gu *et al.*, 2009).

Calculative-based trust was examined by Zhu *et al.* (2011) in online purchase system. The result indicated that customers' trust is affected by the bank being knowledgeable of any violations or cheating. In addition, the role of calculative-based trust, in terms of responsiveness, was examined in virtual communities by Hsu *et al.* (2011). The result specified that the more the user perceived responsiveness, the more trust will be increased.

Additionally, research by Wang *et al.* (2015) connected to mobile commerce indicates that individuals generally demonstrate more trust towards an m-vendor in situations where they anticipate the vendor losing more than they would accrue if they were dishonest. This leads to the following hypothesis:

H3: Customer trust in mobile banking app is directly affected by calculative-based trust.

3.3.2.3*Structural assurance*

This third dimension of trust becomes relevant when structures guaranteeing user safety are implemented and work in a suitable manner. Such mechanisms include legislative and legal controls (Gefen *et al.*, 2003, McKnight *et al.*, 2002). In the context of mobile banking app, structural assurance relates to the extent to which it is perceived that the desired technical and legal elements, including aspects like insurance, encryption and guarantees, are available (Gu *et al.*, 2009, Wang *et al.*, 2015).

The effect of structural assurance on customer trust in internet banking was examined by Ofori *et al.* (2017) in Ghana. The result revealed that there is a positive effect of structural assurance and the users' trust of internet banking will increased if they perceive guaranteeing compensation and protecting their information while they use the website. Kaabachi *et al.* (2017) confirmed the above relationship by using a questionnaire-based approach; they found that structural assurance is one of the main predictors of customer trust in online banking in France. In mobile banking, the link between trust and structural assurance was also proven. For example, Gu et al., 2009 and Wang et al., 2015 in their studies confirmed that structural assurance has the strongest effect on customers' overall trust in the mobile banking system.

However, a study by Lu *et al.* (2010) in China failed to confirm the effect of structural assurance on trust within virtual commerce. This might be due to the

items describing structural assurance, which did not include some of the main structural assurance definitions such as guarantees and security machines.

Also, although empirical research by Alqatan *et al.* (2016) investigated the relationship between structural assurance and customer trust in m-commerce, the result was not significant. The authors related the result to the fact that the responses were dissimilar in structural assurance context and the study recommended establishing a special definition for structural assurance. This led to the following hypothesis:

H4: Customer trust in mobile banking app is directly affected by structural assurance

3.3.2.4*Situational normality*

Situational normality relates to "how normal or customary the situation appears to be" (Gefen *et al.*, 2003, Gu *et al.*, 2009). Within the context of services, it relates to a person's perception that a situation is beneficial and that the provider of the service will effectively fulfil the user's requirements (McKnight *et al.*, 2002). When considering mobile banking applications, it should be recognised that customers' expectations will be built based on their past online interaction with banks in terms of the steps they follow. If individuals do not suffer unusual experiences, there is more chance of them building a trusting relationship with the mobile banking website and vendor. By contrast, if there is an unusual element in the application's presentation or individuals are asked to complete a task that is contentious or not expected, then individuals will be less willing to trust the mobile site or vendor in question (Wang *et al.*, 2015). Thus,

the user's trust in mobile banking will be influenced by the situational normality (Ibid).

This was also verified by Ofori *et al.* (2017) within the e-banking context and it emphasises the importance of situational normality for the participants' decision making and trust. Moreover, Yu and Asgarkhani (2015) examined the effect of situational normality in two different samples, Taiwan and New Zealand. The result from both samples indicates that situational normality is significant for users' trust in using e-banking services.

With regard to customers' trust in information technology it was found by Mcknight et al. (2011) that situational normality is significant for users to use and trust specific technology. Although the study conducted by Eastlick and Lotz (2011) disproved that situational normality has no influence on customer trust in online retailers, situational normality can increase trusting beliefs by reducing privacy concerns. The following hypothesis was developed:

H5: Consumer trust in using mobile banking app is directly affected by situational normality.

3.3.3 Technology adoption variables

The adoption variables for this study's framework initially stem from the TAM constructs and information quality. One reason for this is as Davis *et al.* (1989) formulated the TAM and recommended particular belief aspects connected to IT usage. Numerous researchers have identified the capacity of TAM to outline behavioural intention relating to the use of information systems being superior to the alternative models (Bosnjak *et al.*, 2006, Davis, 1989, Lai *et al.*, 2010).

The TAM has consequently been extensively utilised to explain intentions with regard to the way in which online technology is used. Additionally, Ozdemir and Trott (2009) assert that the TAM presents a practical utility for service developers by offering an indication of where attempts should be focused in order to develop services (Taylor and Todd, 1995). Furthermore, the TAM constructs relating to usefulness and ease of use are extensively referenced within literature relating to mobile banking (Kim and Kang, 2012, Mohammadi, 2015).

As mobile banking app are perceived as being a form of information system, utilising the IS success model is a suitable measure (DeLone and McLean's model) as the theoretical basis for this study's research model. This model provides a description of the information system success measures (Delone and McLean, 2003). It indicates that system quality, information quality and service quality influence use and implementation. Whilst information quality has been the IS success variable that has been referred to most frequently as influencing an individual's intention to use (Akter *et al.*, 2013, Chiu *et al.*, 2017, Shaikh and Karjaluoto, 2015, Shareef *et al.*, 2018), it has not been extensively examined within trust in the mobile banking area (Lee and Chung, 2009). In addition, Petter *et al.* (2013) pointed out that information quality is regarded as fundamental factor of good decision making toward online services. Consequently, the choice was made to regard information quality as an adoption variable within this research framework. Also, as this empirical research uses a survey and interviews for the data collection, it was decided to exclude service quality and system quality from the present model. The two variables have lengthy scale measurements that would have led to a long

survey that consumed a lot of the participants' time, which may have led to incomplete responses. In addition, as pointed out by Goodhue and Thompson (1995) that as it is difficult to examine a large model in a one study, it is preferable to selected and test only central components.

The subsequent sections will outline the significance of each variable in relation to a user's trust and intention to use mobile banking application.

3.3.3.1 *Usefulness*

Davis (1989) defines perceived usefulness as the conviction that a specific technology would enhance the way in which a particular task is performed, and also that the relevant technology would save time for the user. Within the field of mobile banking app, usefulness relates to the extent to which the application provides a variety of bank services anytime and anywhere.

The relationship between trust and usefulness has been reviewed in the online commerce area. For example, Agag and El-Masry (2016) and Benamati *et al.* (2010) are amongst the researchers who have conducted recent research that verifies this link. Agag and El-Masry (2016) combined trust with TAM to examine the intention to use for customers who participate in the online travel community. A positive link between usefulness and trust was found to be important for the use of this community. Benamati *et al.* (2010) scrutinised users of an online book seller and discovered that usefulness is necessary for a user to have the level of trust required to undertake a transaction via e-commerce. However, the study by Yang *et al.* (2015) concludes that in e-commerce, usefulness has no influence on users' trust. They suggested that within the developing phase of online payment, only a small amount of money

per transaction is permitted, in contrast to conventional payment. The benefit of online payments can be said to relate to their comparative ease of use. Within mobile banking, Susanto *et al.* (2016) investigated customers' intention to continue using smartphone banking in Korea. To do so, they examined the impact of perceived security and privacy, usefulness and perceived confirmation in relation to trust. They found that usefulness had an impact on trust and that users would be more willing to trust smartphone banking when they received more benefits.

In addition, the connection between usefulness and intention to use has been examined by numerous scholars (Koksal, 2016). However, there are contradictory findings regarding the link between perceived usefulness and the intention to use. For example, cross-country research into Chinese and Malaysian mobile banking consumers was undertaken by Chong *et al.* (2012). It indicated that usefulness was not important to the way in which consumers used mobile banking. The research also identified that users from these two nations were familiar with mobile phone technology overall. They had a strong awareness of what m-commerce could provide and consequently would not be tempted to utilise m-commerce because of a perception of how useful it would be or by receiving offers of free trials. However, the research undertaken by Susanto *et al.* (2016), who examined the e-banking through smartphone, indicates that usefulness is significantly linked to the persistence of the use of smartphones within a banking environment. This contradiction may be due to the sampling and population. For example, Susanto *et al.* (2016) limited their sample to mobile banking users who were members of an online panel research

company, while Chong *et al.* (2012) collected the sample randomly from two different countries.

As there are contradictory findings regarding the link between perceived usefulness and the intention to use, as well as between usefulness and trust, the hypotheses below have been formulated:

H6: *Customer trust in using mobile banking app is directly affected by perceived usefulness.*

H7: *Customer intention to use mobile banking app is directly affected by perceived usefulness.*

3.3.3.2*Ease of use*

Perceived ease of use relates to the extent to which the potential user believes the relevant system to be devoid of difficulty in its usage (Davis *et al.*, 1989). Ease of use emphasises the user's focus on the relevant task and consequently enhances their experience overall. As using mobile banking systems necessitates a minimum degree of understanding and expertise, ease of use could significantly affect the inclination of the user to utilise such a mechanism. Furthermore, mobile banking necessitates users undertaking banking processes without help from staff working at the bank.

Previous research has supported the positive effect of perceived ease of use on trust within online commerce in general. This was successfully established by Yang *et al.* (2015), who studied 870 users of online payment systems. They found that during the development stage in online payment, users are more willing to trust online payments the easier they perceive the website to be to

use and the less effort they need to make. However, the relationship between ease of use and trust in mobile banking was not confirmed by the study of Gu *et al.* (2009), whose view was that with mobile banking, customers already trust the bank, and therefore do not consider the ease of use of mobile banking.

On the other hand, research into mobile banking has emphasised the significance of the system being straightforward for users to access (Hussain Chandio *et al.*, 2013, Alalwan *et al.*, 2016, Koksal, 2016). The research of Alalwan *et al.* (2016) explored the intention of 500 users of mobile banking using a range of variables. They conclude that ease of use is regarded as a significant influencer variable for customer intention to utilise mobile banking. Johnson *et al.* (2018) also reinforced this conclusion when examining mobile payments using smartphone application. This research discovered that there was a correlation between how easy users believed it to be to use a smartphone payment application and how much they used it. The contradictory links between ease of use and trust, and intention to use and ease of use, lead to the following two hypotheses:

H8: Customer trust in using mobile banking app is directly affected by perceived ease of use.

H9: Customer intention to use using mobile banking app is directly affected by perceived ease of use.

3.3.3.3 *Information quality*

Information quality is comprised of the necessary elements of the system outputs, including its completeness and timeliness, how relevant and accurate the information is, and how accessible and easy to understand it is (Petter *et al.*, 2013). It has been asserted by Akter *et al.* (2013) that information quality is imperative for developing a positive outlook in relation to the advantages of utilising a particular piece of information technology (IT). The degree of content that can be presented on a mobile is restricted because of the screen's size. Consequently, it is significant that information is suitably organised and displayed. To review the quality of mobile banking services, the information displayed should be scrutinised to assess its quality (Zhou, 2013). As customers utilise mobile banking systems to view their account balances and complete payments, the information needs to be sufficient, relevant, accurate and up to date.

Several studies provide evidence of the link between customer trust and information quality. A study by Zhou (2013) investigated the importance of information quality to mobile payment systems. The results show that information quality is significantly important for ensuring customers' trust. Gao *et al.* (2015) found that users are willing to trust the mobile commerce system when the information presented is accurate, relevant and up to date.

With reference to online banking, Montazemi and Qahri-Saremi (2015) found that in the post-adoption phase of online banking systems, information quality plays a considerable role in customers' trust. Ponte *et al.* (2015) e-commerce study in Spain examined the relation between information quality and customer

trust. They found that information quality is one of the main antecedents of trust alongside security and privacy. The investigation of the relationship between trust and information quality in mobile banking appears to have been limited to initial trust. However, the study by Lee and Chung (2009) confirms this relationship in ongoing trust. They revealed that trust in mobile banking is determined by a variety of qualities concerning the mobile banking system and the information that it presents. They claim that banks need to take into account the quality of the information presented in mobile banking.

Despite the importance of information quality to customers' use, the relationship between information quality and intention to use in mobile banking has only been examined through DeLone and McLean's model (2003). Chen and Cheng (2009) examined online shopping by separating intention to use and actual use in DeLone and McLean's model. Although their study was conducted in e-commerce, they confirmed that information quality has a positive relationship with intention to use e-commerce. Tam and Oliveira (2016) also conducted a survey in Portugal, using DeLone and McLean's model. As their model has a mutual relationship between use and user satisfaction, they found that information quality partially affected customers' use of mobile banking. It means that there is a direct effect of information quality on use but not through user satisfaction. This leads to the following hypotheses:

H9: Customer trust in using mobile banking app is directly affected by information quality.

H10: Customer intention to use mobile banking app is directly affected by information quality.

3.4 Research framework and variable definitions

Figure 9 displays the research framework and its research constructs. This framework uses Gefen (2003) and McKnight *et al*. (2002) trust dimensions as a basis and modifies them to fit in with this study's focus on mobile banking app. Furthermore, this framework incorporates the prominent TAM constructs: usefulness and ease of use, in addition to information quality from DeLone and McLean's model. This framework asserts that customer trust can have an influence on their intention to use mobile banking app. The way in which the research constructs are defined are also indicated in Table 9.

Variable	Definition	Resource
Trust	A set of specific beliefs consisting of competence, benevolence and integrity.	Gefen *et al.* (2003)
Familiarity with vendor	Understanding from prior effective interactions and experience that incorporated online or mobile banking.	Gefen *et al.* (2003)
Structural assurance	Regarded as safety nets including legal materials, guarantees and legislations relevant to mobile banking application.	Gefen *et al.* (2003)
Situational normality	The stages needed in mobile banking application have similarity to online or offline banking.	Gu *et al.* (2009)
Calculative-based trust	Customers will have faith in mobile banking systems when they hold the perception that mobile banks would obtain no advantage from breaching the trust of customers.	Gefen *et al.* (2003) Gu *et al.* (2009)
Usefulness	The extent to which the users' consideration of the likelihood that using a mobile banking application will improve their performance in the workplace.	Davis *et al.* (1989)
Ease of use	The extent to which the user of the mobile banking application anticipates it being easy to use and devoid of complication.	Davis *et al.* (1989)
Information quality	The content provided by mobile banking application are accuracy, currency, relevance, completeness and up datedness.	Chen and Cheng (2009), Delone and McLean (2003)

Table 9: Research constructs definitions

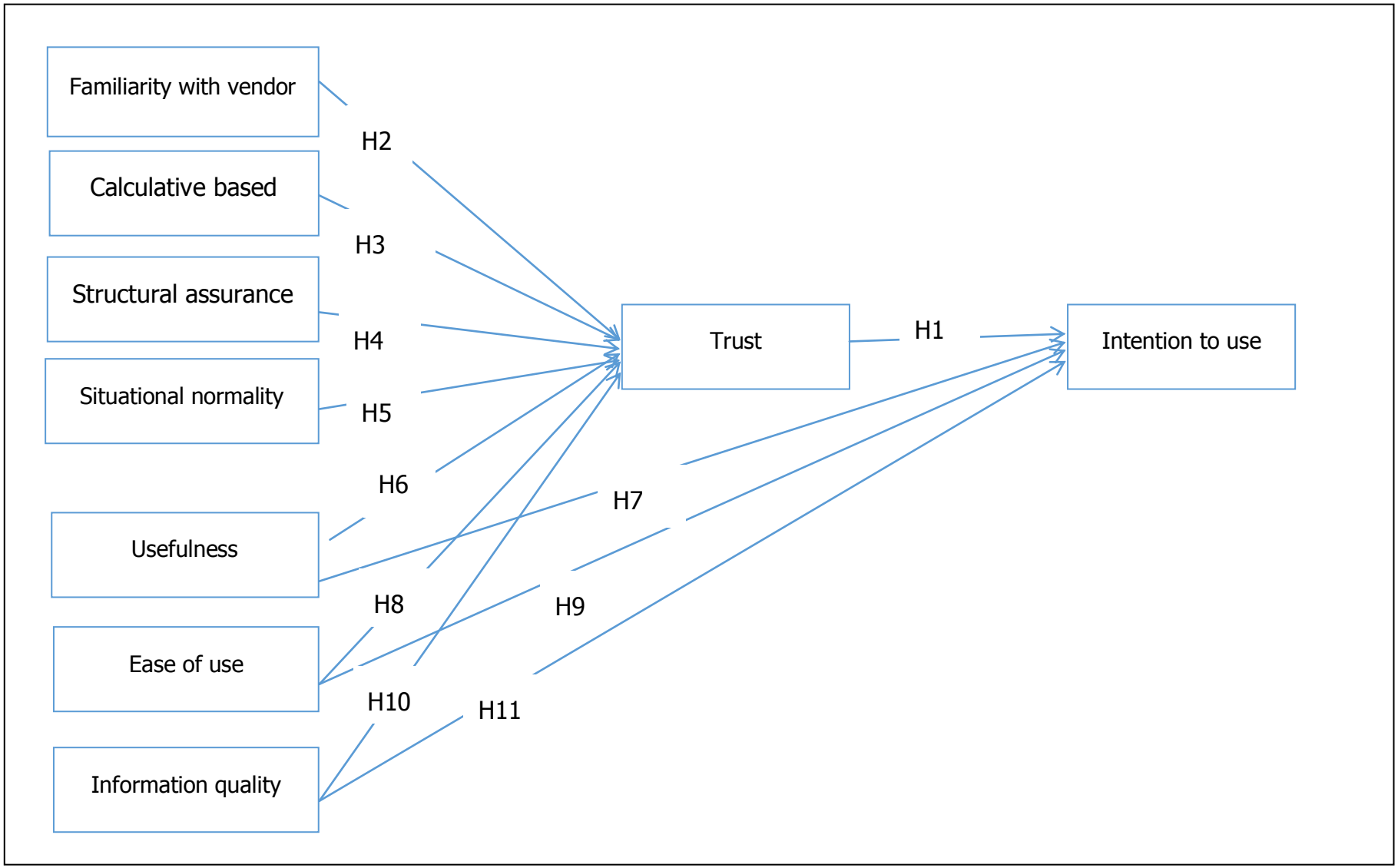

Figure 9: Research framework

3.5 Chapter summary

This chapter has formulated a trust-based model relating to mobile banking app in connection to the literature reviewed. It is suggested that there are seven factors that have an impact on a prospective user's trust and intention to use a mobile banking application. These seven perceptions are as follows: trust, familiarity with vendor, structural assurance, situational normality, calculative-based trust, usefulness, ease of use and information quality. The methodological approach of this research study will be outlined in the subsequent chapter.

Chapter 4. METHODOLOGY

4.1 Chapter introduction

This chapter demonstrates the research methodology used to achieve the research aim and objectives. Also, the chapter presents the research paradigm, research design, strategy and methods used in this research. Moreover, the sample size for both parts of the data collection is explained. In addition, the chapter reflects on the research tools used to collect the data with the appropriate data analysis techniques for the survey and interview

4.2 Research paradigm

In the IS research area, there are several research models. A paradigm has been defined as "a basic set of philosophical beliefs about the nature of the world. A research paradigm provides the guidelines and the principles associated with the way to conduct research" (Veal, 2005, p.25). When the research paradigm has been chosen, the research methods should be selected to conform with this paradigm. According to Oates (2005), there are various means of obtaining knowledge and observing reality (ontology) for each different research model. According to Creswell (2003) epistemology indicates opinions as to how ontology and knowledge may be built as the means of observing reality. It is worthy of emphasis that, from this perspective, such paradigms influence research techniques and strategies which guide and establish the principle of research. Saunders, Lewis and Thornhill (2009) claim that there are four principal philosophies of research: positivism, realism,

interpretivism and pragmatism. Furthermore, they indicate how these four philosophies differ as depicted in Table 10.

	Positivism	**Realism**	**Interpretivism**	**Pragmatism**
Ontology: the researcher's view of the nature of reality or being	External, objective and independent of social actors	Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple	External, multiple, view chosen to best enable answering of research question
Epistemology: the researcher's view regarding what constitutes acceptable knowledge	Only observable phenomena can provide credible data, facts. Focus on causality and law like generalisations, reducing phenomena to simplest elements	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations which are open to misinterpretation (critical realism). Focus on explaining within	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret

		a context or contexts		the data
Axiology: the researcher's view of the role of values in research	Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Research is value laden; the researcher is biased by world views, cultural experiences and upbringing. These will impact on the research	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view
Data collection techniques most often used	Highly structured, large samples, measurement, quantitative, but can use qualitative	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in-depth investigations, qualitative	Mixed or multiple method designs, quantitative and qualitative

Table 10: Research philosophy adapted from (Saunders, 2009).

Pragmatism regards the research question as being the main determinant of the axiology, ontology and epistemology which that question adopts (Saunders, 2009). The pragmatism paradigm is regarded as being an "umbrella" which could incorporate multiple approaches for a single research project (Creswell, 2013).The ontology and epistemology of pragmatism have been selected as a suitable paradigm for this study. In order to investigate the research question fully, the researcher does not restrict herself to one single paradigm, but rather incorporates both the positivist and interpretivist opinions. Research questions are the reasoning behind the method selection in which the application of either qualitative or quantitative techniques does not tackle the research issue,

whereas a coordination of techniques does (Creswell and Clark, 2011). The fact that the presence of multiple realities is present in any given situation is stressed by the pragmatism method. Furthermore, the model which the researcher decides to use depends upon the question which the study is attempting to resolve (Saunders *et al.*, 2009). This method also enables the utilisation of both quantitative and qualitative research techniques in order to gather information and to inquire into the complicated phenomenon of natural and social environments (Creswell, 2009; Morgan, 2007). Consequently, the mixed methods may be enabled by the pragmatism research philosophy, since the data-gathering system allows the opportunity of being subjective and objective in the analysis of the participants' opinions (Saunders *et al.*, 2009).The pragmatism research method in the epistemological model supplies the reasoning and justification for coordinating techniques as well as supplying provisional solutions to research questions for combining methods and techniques within a study (Johnson *et al.*, 2007). However, the pragmatism research method, which is a recent development in discussions on research philosophies, concentrates upon this issue and attempts to discover practical answers by applying mixed methods (Saunders *et al.*, 2009).

4.3 Research design

A research design refers to the overall strategy or logic that is used to guide the research and ensure that the research questions are answered (Blaikie, 2009). The research design can be based on two different ways of reasoning: inductive or deductive reasoning (Ibid). A description of both of these strategies is provided in Table 11.

Research Strategies	Methods of Reasoning	Source
Inductive Reasoning	- This is seen as a theoretical approach. The researcher uses previous research and interaction with individuals who are informed on the subject under study to reflect on ideas. The researcher analyses and synthesises this information to formulate a new view of the situation, which in some cases may be accepted by scholars as a new theory. -The new theory or ideas that are developed are based upon observations of reality. Inductive reasoning aims to provide an explanation for people's behaviour, characteristics and social situations so that any patterns in the nature of the relationship between these elements can be determined. - The research tends to be exploratory in nature, particularly when the research begins. This approach is mostly linked to qualitative research. - Data is collected and then analysed, followed by the researcher developing generalisations based on inductive logic. The outcome of studies designed in this way is a new theory.	Blaikie (2009); Bryman and Bell (2015); Collis and Hussey (2013)
Deductive Reasoning	- The nature of this approach is narrower and its emphasis is on testing or confirming hypotheses. - The research starts with general concepts and progresses to more specific ones. - It is known as a "top-down" approach. - The research is based on theories and a type of empirical research. - This approach is mostly linked to quantitative research. - Specific data is used to test hypotheses, and then the original theory upon which the research was based is either rejected, confirmed or extended.	Blaikie (2009); Collis and Hussey (2013).

Table 11: Difference between Inductive and Deductive Strategies

Both of the above designs are employed in this thesis in order to give a more profound understanding of the use of mobile banking apps. Initially, the deductive approach is used because the main aim of the thesis is to develop and test hypotheses by reviewing previous studies and theories related to customer trust and use of mobile banking. Then, collect the survey data on the basis of the current theoretical model on customer trust and utilisation in mobile banking apps. Subsequently, the inductive approach is used in order to

discover a more profound pattern from the interviews, which helps to improve the explanation of the survey result.

4.4 Research Strategy

The research strategy determines whether the research is classed as exploratory explanatory or descriptive. These different purposes are explained by Lewis *et al.* (2007). The aim of the first of these, exploratory research, is to make enquiries in order to establish what is happening in a certain situation (Robson, 1993). It is a suitable approach when the research concerns a topic that has not been studied extensively before, so there is little available information, and it aims to discover new insights (Churchill and Iacobucci, 2006). According to Hair (2015) , exploratory research aims to: 1) formulate a problem so that it can be investigated more thoroughly; 2) determine the priorities for research carried out in the future; 3) gather data regarding the practical problems of conducting research on certain conjectural statements; and 4) allow the researcher to become more familiar with the concept under study.

Moving on to explanatory research, this is used to examine the relationship between variables associated with the phenomenon being studied in order to explain this relationship (Lewis *et al.*, 2007). It is suitable when the research aims to: 1) establish the variables that are causing the phenomena under study; 2) understand the nature of the relationship between the variables and the phenomena that is the subject of the research (Kinnear and Taylor, 1996).

Finally, in descriptive research, the aim is to accurately profile the phenomenon or situation under study (Robson, 2002). It is a suitable approach when the

study needs to provide a description of a group's characteristics, predict certain behaviour or estimate how many people in the target population follow a certain behaviour (Churchill and Iacobucci, 2006, Lewis et al., 2007). Descriptive research aims to answer 'what?' and 'how?' research questions (Hair, 2015).

The current study applies the explanatory method. For the reason that, in line with the previous chapters, the hypotheses are closer to the definition of the explanatory method because such hypotheses are formulated on the basis of the proposed connections between the variables, such as trust and the intention to utilise mobile banking and trust dimensions and trust. According to Saunders *et al.* (2007), researchers who demonstrate relationships between variables are likely to adopt an explanatory method.

4.5 Research method

Research in social science tends to use either qualitative or quantitative techniques to separate, respectively, the methods of data collection and the techniques of data analysis (Lewis *et al.*, 2007). Because qualitative and quantitative strategies pursue separate paths when engaged in social research, they may each be more applicable to some types of research questions than others.

When gathering and analysing data, qualitative research concentrates on meaning, more so than quantification (Bryman, 2015). It explores social phenomena much more deeply, thereby providing more significant insights (Ibid). In qualitative research, the focus is on seeing the occurrences, actions, norms and values from the participants' viewpoints, which allows the researcher

to better understand the subject under study (Bryman, 2015, Lewis *et al.*, 2007). According to Bryman (2015), this technique tends to be deployed when no theoretical basis has been established, and when the subject has been little researched. The various research mechanisms of qualitative strategies employ an interpretative style, such as in-depth interview or focus groups. They look at the object of study in its context and take into account any subjective interpretations that individual people have (Ibid).

Quantitative research is different. It is designed to concentrate on quantification in its approach to gathering and analysing data (Bryman and Bell, 2015). It uses a planned data collection to either portray or envisage a social phenomenon as an action template, or to analyse the links between the variables. When researchers employ this technique, they need to use structured mechanisms for the gathering of data – structured interviews or questionnaire surveys, for example – so as to employ statistical methods to assist them with data interpretation (Lewis *et al.*, 2007).

This research's position in terms of methodology is dependent on both qualitative and quantitative strategies being used. This is because, firstly, the study's – and the research design's – philosophical assumptions are embedded in both strategies. Secondly, qualitative and quantitative approaches provide insights into the social world that are complementary, as Cupchik (2001) relates; this complementarity indicates that precise findings can be augmented by richness as a result of more information being engrossed in the in-depth account. At the same time, concentrating on precision can mean that basic concepts are better explained. Various authors (Bryman and Bell, 2015, Hair, 2015) have recommended using more than one method in order to raise

research outcomes' levels of reliability and authenticity. This is echoed by Denzin and Lincoln (2011,p.5) 'The use of multiple methods, or triangulation, reflects an attempt to secure an in-depth understanding of the phenomenon in question'. Table 12 provides a comparison between quantitative and qualitative approach.

The quantitative data will allow the researcher to test the variables that have an impact on the level of trust of consumers in mobile banking in Saudi Arabia. The qualitative data will provide an understanding of how customers perceive mobile banking app, thus supporting the interpretation of the quantitative results by providing more in-depth data and an explanation of the survey result.

One of the benefits of mixed methods is that the analysis can be advanced by the data from one method being used to support the other (Denscombe, 2008). Therefore, it is important that careful thought is given to the order in which each of the methods are used (Bryman and Bell, 2015). In this study, the qualitative method will follow the quantitative phase in order to provide insights into consumers' trust on using the bank application. The two sets of findings will be combined in order to provide a full picture of which factors impact consumer trust and intention to use mobile banking in Saudi Arabia.

Quantitative approach	**Qualitative approach**
1- Closed questions are utilised 2- Predetermined approaches are taken to examine or prove theories 3- Numerical data is used- The variables to research are determined, as relevant to the questions or hypotheses that are formed - Standards of validity and reliability are implemented.	1- Open-ended questions are utilised, allowing collaboration with respondent. 2- Emerging methods are taken which compile participant meaning 3- Textual or image data is referenced – A specific idea or phenomenon is studied, with a greater emphasis on validity.

Table 12: comparison between qualitative and quantitative studies

4.6 Research Techniques

4.6.1 Data Collection Techniques

Primary data may be gathered by applying various methods, the most frequent of which is the inclusion of: observations, interviews, focus groups, surveys and questionnaires (Lewis et al., 2007). Table 13 depicts the frequently-applied data- gathering systems as presented by (Lewis et al., 2007). This research has used survey and interviews as data collection techniques. within a pragmatism research philosophy, the survey (quantitative) and interview (qualitative) can be used to complement each other in order to address the research question. The order of which technique was informed by the research design. As stated in section 4.3, the deductive approach used first to test and develop hypothesis that reflect the effect of trust and adoption variables on customer intention to use mobile banking app. Thus, the survey data collection was employed first. Then, the interview was used to generate more insight and meaning that may increase the understating of customer use in mobile banking in Saudi Arabia.

Data collection Type	Strengths	Weaknesses
Focus groups	This method is regularly utilised in order to obtain detailed beliefs, collective outlooks, and to acquire anecdotes from a small number of individuals simultaneously. - A group setting might produce additional insights and suggestions compared to conducting interviews on an individual basis - Can be utilised as a suitable means of emphasising the elements raised by prior research methods, such as surveys. - Individuals only need to express themselves verbally; there is no obligation or necessity to read questions/ information or to communicate through the written word. Participants are not required to read or write. It relies on oral communication.	Researchers and participants need to commit more of their time to the study and there might be restrictions on when individuals are available to meet. The researcher also needs to find the participants initially. - A suitable individual needs to lead the conversations to guarantee that suitable insight is provided and all participants are able to contribute - Conventionally, equipment is needed in order to accurately record and then transcribe the communications held within the focus group.
Interviews	- Effective means of compiling detailed outlooks, viewpoints and personal previous experiences for each individual. - Individual communication might provide more insightful and extensive content. - Offers the possibility of discussing relevant subjects in more depth, depending on the specific participant.	- A time commitment is needed from both interviewer(s) and interviewee(s). - A suitable space is required to undertake the interviews in a quiet setting. - Equipment is needed in order to accurately record and transcribe responses. - Challenges can be encountered in acquiring reliable information depending on the behaviour and cooperation of the participants. - Extensive time is required to undertake analysis.
Observation	- Offers examples of the influence on the study; these might have greater reliability compared to data acquired by directly asking an individual a question. - Effective method in situations	- Necessitates a time commitment to the observation process from both parties. - It is not possible to communicate with the participants during the process;

	where there are observable products and results.	it might be beneficial to incorporate a subsequent interview stage to confirm the findings.
Questionnaires	Effective for obtaining brief comments from participants relating to their outlook and viewpoint. - Can incorporate a range of closed- and open-ended questions - Can be processed online as well as on paper. - There are fewer logistical difficulties to overcome; one researcher is generally able to administer the process and in-person meetings with participants are not required.	- Only a specific range of questions can be asked; the researcher cannot obtain more detail about a participant's answer or clarify any ambiguities. - Individuals need to have sufficient reading/writing skills to participate. - Questionnaires generally need to undertake a pre-testing stage to ensure there is no confusion or ambiguity in the wording; this can be a time-consuming process. - Respondents might misunderstand a question and thus provide an answer that is not relevant or accurate.

Table 13: Data collection methods

4.6.2 Survey

4.6.2.1 *Procedure and Measurement*

Using a survey to collect data is an accepted and popular data collection method. With a survey, the researcher can gather information on the views, attitudes and concerns of the participants in a structured way. It also enables the researcher to reach a large number of people relatively easily, thus increasing the chances of being able to generalise the findings to the wider population.

According to Bryman (2015), structured interviews and questionnaires are the most commonly used methods within survey research. This approach is associated with the philosophical paradigm of positivism, as it looks for patterns in data and aims to make generalisations. One of the distinct advantages of survey research is that it enables the researcher to gather data from a wide range of people within a relatively short, specified time frame. A survey questionnaire is a series of questions that can be very carefully designed by the researcher in order to gather the relevant data from the participants in a predetermined order (Payne and Payne, 2004).

4.6.2.2 *Question Scaling*

Bernard and Bernard (2012) have defined scale as "a device for assigning units of analysis to categories of a variable". This definition is applied to grade individual answers to a statement or a question, or to compare the responses of a group to the questions. Furthermore, Trochim (2006) has defined scaling as "the branch of measurement that involves the construction of an instrument

that associates qualitative constructs with quantitative units". Scale is applied to evaluate dimensions based upon a series or ratings or ranking (Bernard and Bernard, 2012).

Many scales types have been utilised in questionnaires, but the most frequently used is the Likert scale. Rensis Likert developed this scale in 1932 as a system of evaluating respondents' opinions to a set of specified statements on a subject or a theme. It indicates the level to which respondents agree or disagree with the statements, consequently tapping into the affective and conceptual component of their opinions (McLeod, 2008).

4.6.2.3 Q*uestionnaire Development Process*

The protocols advocated by Churchill and Iacobucci (2006) form the template from which the researcher developed this study's questionnaire. The ensuing sub-sections explain the various processes:

1) Specifying the information to be sought
2) Elaborating the items on the questionnaire
3) Deciding the type of response to the questions
4) Working out each question's wording
5) Deciding on the questionnaire sequence
6) Calculating the questionnaire's physical make-up
7) Translating the questionnaire
8) Pilot study.

Specifying the information to be sought

Churchill and Iacobucci (2006) suggest that when a construct is being measured the first step entails specifying the domain. To decide on boundaries, a thorough appraisal of the literature on bank customers' trust in mobile banking was conducted. In addition, it involves the selection of the specific banks and participants. Churchill's words on this were that it: *"must be exacting in delineating what is included in the definition and what is excluded" (Churchill and Iacobucci, 2006,p.67)*. This researcher has gathered data on the conceptual model's specified variables. The questionnaire was specifically constructed to explore the research hypotheses (see Chapter 3).

Elaborating the items on the questionnaire

The questionnaire's style and approach is the next stage to be decided. A survey approach is the style that is normally used by empirical studies, with a structured data set that has been collected from a questionnaire sent to a large number of respondents in a population (Maylor and Blackmon, 2005, Lewis *et al.*, 2007). Consequently, the researcher sent out questionnaires in which the respondents answered a set of closed-ended questions privately and in their own time, without the researcher being there (Lewis *et al.*, 2007). The three methods most often used to distribute questionnaires are by post, by telephone, or face to face (Bryman and Bell, 2015), but increasing internet access in the last decade has facilitated the rise of the online survey – email or web (Ibid). In light of this, this study used both web-based forms and printed

copies of the questionnaire. The recipients were the two chosen banks' (Alrajhi Bank and Samba Bank) customers. Over 1,000 printed copies were sent out, but only 250 were returned. As a result, internet surveys were considered to help increase the response rate.

The benefits of internet surveys are several. They are faster – complete coverage can be attained by sending one form - and response rates can be higher than with traditional methods. Data analysis is easier to achieve, and data entry is automated, therefore Excel files can be input directly into standard programmes that analyse software, e.g., the Statistical Package for the Social Sciences (SPSS). Following the classification information, the participants were asked if they had used any mobile banking app. If the answer was no, the survey immediately directed them to the demographic page of the survey.

A review was made by the researcher of the way in which the literature's variables were previously defined, and how many of the selected dimensions contained the majority of attributes; this can influence how the studied constructs are perceived. The preliminary item-generation stage yielded 31 items for the main constructs. In the subsequent sections, the constructs and their measurements are shown, the measures having been customised mostly from prior research. The measures have also been adapted to suit this study's context. All the selected items for this research were adapted from validated items and instruments used in same field of study. A summary of all items used in the current research with the adapted source for these items are presented on Table 14.

In addition, demographics variables that likely to have effect on customer's intention to use mobile banking app were included in the survey. These

variables are age, gender, level of education and occupation, purpose of using smartphone application and internet experience.

Variable	Items	Adapted from
Usefulness	1- I believe that using a mobile banking application will allow me to accomplish my tasks more quickly. 2- I believe that mobile banking application are useful because I can access them anytime and anywhere. 3- I believe that a mobile banking application will give me easy access to the information I need. 4- Overall, using a mobile banking application is useful.	Gefen *et al.* (2003)
Ease of use	1- I believe that interaction with mobile banking application does not require a great deal of mental effort. It is clear to use the app. 2- I believe that it is easy to use a mobile banking application to accomplish my banking tasks. 3- I believe that it will not be difficult to learn to use a mobile banking application. 4- Overall, using mobile banking is easy.	Gefen *et al.* (2003)
Information quality	1- I believe that a mobile banking application will give me access to information relevant to my needs. (relevance) 2- I believe that a banking app will give me access to sufficient and reliable information. (reliability completeness) 3- I believe that a mobile banking application will give me accurate information. (accuracy) 4- I believe that a mobile banking application will give me up-to-date information (up to date).	Nicolaou and McKnight (2006) and
Familiarity with the vendor	1- I am familiar with my mobile banking provider because I visit their website and obtain information about it. 2- I am familiar with my mobile banking provider because of information in magazines, newspapers or TV. 3- I am familiar with my mobile banking provider through the use of mobile banking services such as SMS and web-based banking.	Gefen *et al.* (2003)
Structural assurance	1- I feel safe conducting business through mobile banking due to its statements of guarantees. 2- I feel safe employing mobile banking services because the bank has sufficient security mechanisms for my protection. 3- I feel safe using mobile banking services because the advances in communication technology afford adequate protection.	Gefen *et al.* (2003)
Situational normality	1- I believe the information requested of me from mobile banking application is the type of information most similar to offline banking requests. 2- I feel safe using mobile banking application services because the steps required in mobile banking are typical of most bank app. 3- I feel safe using mobile banking application services because the interaction with mobile banking is typical of most mobile app.	Gefen *et al.* (2003)

Calculative-based trust	1- I believe the mobile banking vendor has nothing to gain by being dishonest in its interactions with me. 2- I believe the mobile banking vendor has nothing to gain by not caring about me. 3- I believe the mobile banking vendor has nothing to gain by not being knowledgeable when helping me.	Gefen *et al.* (2003)
Trust	1- I believe mobile banking application are trustworthy. 2- I believe mobile banking application keeps their promises and commitments. 3- I trust in the benefits of mobile banking app.	Gefen *et al.* (2003)
Intention to use	1- I intend to use mobile banking services continuously in the future. 2- I will recommend others to use mobile banking services. 3- I will frequently use mobile banking services in the future.	Gefen *et al.* (2003)

Table 14: Questionnaire Items**.**

Deciding the Type of Response to the Questions

For this study, it was decided that closed-ended questions were the most suitable, mainly because they are less complicated administratively, easier and quicker for the respondent to complete and tabulation and analysis are easier (Churchill and Iacobucci, 2006). A seven-point Likert scale was applied uniformly over the questionnaire's first two sections to ensure a better consistency of response style. seven-point Likert scale allow the participants to have more choices and provide them with exact choice rather than closed choice. The final section, which was about demographics, was constructed to elicit 'tick' answers.

Deciding on the Questionnaire Sequence

Having decided on what type of response would be needed, the researcher had to insert the questions in an appropriate order. This can be a significant factor: Churchill and Iacobucci (2006) claim that researchers need to note that the sequence of the questions can contribute markedly to the research's success. Churchill and Iacobucci (2006) relate that the introductory questions need to be simple, yet thought-provoking, but without anything that might cause the respondents to have concerns. Any personal or demographic questions that may involve sensitive information should be saved for the end of the questionnaire. This study has followed the above guidelines, structuring the questionnaire into four parts. Section One deals with whether the respondents have used their bank's mobile app before, while the next section concerns the respondents' perceptions about the usability and adoption variables of the app. Section Three is all about the trust dimensions, while demographics are the subject of the final section.

Working out Each Question's Wording

Precise phrasing of questions is crucial, because ambiguity in the questions can result in questions being misunderstood, or even in respondents' refusal to answer.

As was highlighted by Churchill and Iacobucci (2006), many researchers come across problems with vocabulary. Because of this, the researcher planned ahead by conducting preliminary testing of the questionnaire before the final version was distributed. This eliminated ambiguities, unknown abbreviations and questions that may have appeared confusing. Additionally, mobile banking app was defined at the start of the questionnaire, so as to avoid respondents confusing it with the other models of electronic banking. In addition, some items such as EASE2 and SA5 were asked in negative sentence (reverse code item), this has been done to make sure that the responses are paying attention the content of the survey and reduce the response bias.

Calculating the Questionnaire's Physical Make-up

Churchill & Iacobucci (2006) observe that question order is significant in a questionnaire, but they also claim that the physical look of a study can affect the whole process – in terms of obtaining correct information, but also with regard to how willing potential participants might be to take part in a study. If the questionnaire looks untidy and unprofessional, respondents may be unwilling to reply because they may think the study is inconsequential. The questionnaire must, therefore, echo the study's importance. The researcher consequently made every effort to give a professional look to the questionnaire.

During the pilot study, the respondents were asked to give their opinions on fonts, layout, the wording of the questions and their order. It was also printed on premium paper and had a covering letter enclosed. This stated the study's aim and its significance, in an effort to obtain the respondents' cooperation and goodwill (Churchill and Iacobucci, 2006). The letter also promised to keep all answers completely confidential, and it confirmed that Manchester Metropolitan University were the study's supervisors, see Appendix (B).

Translating the Questionnaire

So that respondents can properly understand a questionnaire and complete it fully, it is important for the language used to be a respondent's native language. Arabic was therefore used, it being the respondents' common language, and the back-translation method recommended by Bulmer and Warwick (1993) was used. This method entails: 1) Translating the questionnaire from the original language to the local one; 2) Getting another translator to translate it back into the original form; 3) Comparing the result with the original version in order to rectify any errors. The survey items were originally written in the English language. Then, they were translated into Arabic. The back-translation method was used where another bilingual person translated the Arabic version back into English. This process is to make sure the items in both languages are equivalent and expressing the same meaning. In light of that, a few words in Arabic were deleted, as they had no meaning in the sentences, see Appendices A and B for the English and Arabic versions.

Pilot study

It is advisable to test the questionnaire with a short pilot study before distributing it widely for the main data collection (Churchill and Iacobucci, 2006,

Bryman and Bell, 2015). Conducting a pilot study will make sure that any problems with participants understanding and answering the questionnaire are identified and corrected, as well as ironing out any problems with recording the data (Churchill and Iacobucci, 2006). It also allows the researcher to assess the validity of the questions and the reliability of the data.

The pilot study was done in two stages. The first one was to check the survey word and translation (see section Translating the Questionnaire). The second was in Saudi Arabia to make sure that the participants were from the selected banks. 20 copies of the questionnaire were distributed by hand. 12 of these copies were return completed with some comments that were used to enhance the main survey. However, as this done during Ramadan time, the researcher used an online survey to gain more responses. From the online survey, 67 responses were obtained. The survey was distributed through social media and email.

Based on participants' feedback, a number of aspects of the questionnaire were identified for improvement, predominantly in relation to refining question wording, evaluating the question ordering and the layout of the questionnaire. For example, the questions related to adoption variables (ease of use, usefulness, information quality) are set on one page; when the participants finish this page, they will be directed to the trust variables page, before moving onto the demographic page. This helps the participants to move fluently through the survey. The results from the pilot are illustrated in Table 15. Table 16 presents the final survey items which include 37 items.

Variables	Item Code	Chang made	example
Information quality.	IQ2	Separate the item into two items.	IQ2: I can find reliable information through a mobile banking app. IQ3: I can find adequate information through a mobile banking app.
Usefulness	USE2	Add item	USE2: I think mobile banking app permit me to access the required transaction without problems.
Ease of use	EASE4	Add item	Ease4: I can learn how to use mobile banking app easily.
Structural assurances	SA2,SA4	Add items	SA2: I feel unsafe because the bank's statements of guarantees are not clear. SA4: I feel safe using mobile banking app services because they are generally safe.
Situational normality	SN2	Separate the item into two items.	SN2: The steps required in mobile banking app are typical of web-based mobile banking. SN3: The steps required in mobile banking app are typical of SMS mobile banking.
Calculative-based trust	CT4	Add items	CT4: Mobile banking vendors take a long time to respond to any issue regarding the app.

Table 15: Pilot Study result.

Variable	Item code	Item
usefulness	USE1	I can accomplish my tasks more quickly with a mobile banking app.
	USE2	I can access mobile banking app anytime and anywhere.
	USE3	I think mobile banking app permit me to access the required information without problems.
	USE4	I think mobile banking app permit me to access the required transaction without problems.
	USE5	Overall, mobile banking app are useful.
Ease of use	EASE1	I can utilise a mobile banking app with little mental effort.
	EASE2	It is not clear how to use the bank app.
	EASE3	I can accomplish banking tasks easily with mobile banking app.
	EASE4	I can learn how to use mobile banking app easily.
	EASE5	Overall, using mobile banking app is easy.
Information quality	IQ1	I can access information relevant to me through a mobile banking application.
	IQ2	I can find reliable information through a mobile banking app.
	IQ3	I can find adequate information through a mobile banking app.
	IQ4	I will obtain accurate information from a mobile banking app.
	IQ5	I will find up-to-date information on a mobile banking app.
Familiarity with vendor	FV1	I am familiar with my mobile banking provider by using their website.
	FV2	I am familiar with my mobile banking provider through magazines, TV or newspapers.
	FV3	I am familiar with my mobile provider by using mobile banking services such as SMS and web-based banking.
Structural assurance	SA1	I feel safe when I do business with a mobile banking app because of the statements of guarantees.
	SA2	I feel safe using mobile banking app services because the banks have effective security mechanisms.

	SA3	I feel safe using mobile banking app services because the advances in communication technologies can adequately protect me.
	SA4	I do feel not safe because the bank's statements of guarantees are not clear.
	SA5	I feel safe using mobile banking app services because they are generally safe.
Situational normality	SN1	The information that I am required to give when using mobile banking app is similar to that requested in online and offline banking.
	SN2	The steps required in mobile banking app are typical of web-based mobile banking.
	SN3	The steps required in mobile banking app are similar to those in SMS banking.
	SN4	I feel safe using mobile banking app services because the interaction with mobile banking app is typical of most mobile app.
Calculative-based trust	CT1	Mobile banking vendors have nothing to gain by being dishonest in their interactions with me.
	CT2	Mobile banking vendors have nothing to gain by not caring about me.
	CT3	Mobile banking vendors have nothing to gain by not being knowledgeable when helping me.
	CT4	Mobile banking vendors take a long time to respond to any issue regarding the app.
Trust	TR1	Mobile banking app are trustworthy.
	TR2	Mobile banking app keep their promises and commitments.
	TR3	I believe that mobile banking app seek to deliver benefits to customers.
Intention to use	IU1	I intend to continue to use mobile banking app in the future.
	IU2	I will recommend others to use mobile banking app
	IU3	I will frequently use mobile banking app in the future.

Table 16**:** Final survey items.

4.7 Sampling

Because it cannot be expected that all of the constituents of a country's population can be consulted, a carefully chosen sample can yield sufficiently representative data (Hair, 2015). Hair (2015) articulated a collection of processes, which are shown in Table 17.

	Explanation	**Study Sampling Process**
Defining the Target Population	Constituent group of items relevant to the research project; they contain the data that the research project is structured to gather. Items should represent the target population from which they are taken.	Elements: customers must have utilised the mobile banking application (Al Rajhi, SAMBA). Extent: All the Saudi population (Saudi and non-Saudi). Time: 23th September -15th November 2016.
Selecting the Sampling Method	Choosing sampling types depends on issues such as the nature and the goals of the study, plus the time and the budgets.	Non-probability: Convenience sample method.
Determining the Sample Size	Efficient sample sizes can be taken from large or small populations.	The Total Sample Size: 900 was achieved in this study.
Implementing the Sampling Plan	The final stage in the sampling process.	Survey Distribution: Paper-based and electronic web survey.

Table 17: Sampling process

4.8 Population

Defining the population of relevance is the first stage in the sampling concept. Population, according to Bryman & Bell (2007), means the complete contingent out of which the sample will be chosen. When constructing a definition of the population that is to be investigated, the researcher needs to precisely specify which constituents are to be included and, conversely, which ones are to be omitted. The process of defining the population that is to be studied consists of several steps. It must be decided what the population consists of, in terms of things like people, households, institutions, and voluntary bodies, what will be the limits in terms of geography, or any other criteria. The criteria for this study's population was that all the people who used mobile banking app, and used either or both of the chosen Saudi banks for this study.

4.8.1 Selecting the Sampling Methods

Seeking to gather data from the entire population of Saudi Arabia would be impossible, so acquiring a sample from the population at large is thought to be an acceptable method for this study. In the existing literature that is relevant to this study there are two principal varieties of technique that could be used to gather data. The first is the probability, or random, technique; the second is the non-probability, or non-random, technique. The most representative method of sampling is probability, which is often used for studies that are survey based (Lewis *et al.*, 2007). Probability sampling's aim is to select elements via a random process; this means that the constituents have a non-zero possibility of being chosen (Hair, 2015). The converse of this is non-probability, or non-random, sampling. This

technique offers a variety of different methods that are founded on a subjective type of judgement. This method is normally selected within the exploratory stages and during the construction of the survey (Lewis *et al.*, 2007).

Convenience sampling, however, is the most often-used non-probability sampling method. Alternatively known as haphazard or accidental, convenience sampling necessitates choosing the sample elements that are most at hand and which can furnish necessary information for the study. The method also categorises the breadth of alternative responses (Hair, 2015). It is employed until the sample size that is needed has been achieved (Hair, 2015).

One thousand copies of the survey were distributed with the collaboration of the selected banks. 250 copies were returned. However, 130 of these copies were not included in subsequent analysis, because the respondents were not users of the mobile banking app. In addition, the researcher used Survey Monkey as an online tool to distribute the survey through social media. Prior to distributing the survey, the permission for the selected banks was sought to target their customer through media. The sampling frame was not obtained from the bank. One of the features of the Survey Monkey tool is that it shows how many respondents have actually started, but not completed, the survey. The total number of respondents who participated in the survey was 1230. The total number of respondents who fill the survey was 915. However, 315 of the submissions were rejected as they were from people who did not use the mobile app. Thus, taking the responses from the paper questionnaire distribution, and the online distribution, the total number of usable questionnaires was 900.

Method of distribution	Distributed	Returned	Number of users
Paper-based	1000	250	120
Online Survey Monkey	1230	915	780
Total	2230	1097	900

4.9 Interviews

4.9.1 Procedure and approach

DiCicco-Bloom and Crabtree (2006) discuss both structured and unstructured interviews. The former is a quantitative method, but the latter may result in the gathering of many different views that do not necessarily support the research aim. For the previous reasons, the structured and unstructured interview types were not selected.

However, with semi-structured interviews, there are many advantages. For example, while some control is maintained over the questions being asked, it is possible to gain a more detailed picture of the participants' beliefs and perceptions. In addition, this method has more flexibility for asking questions; questions can be modified during the interviewing and the researcher can ask follow-up questions. With this in mind, semi-structured interviews will be employed in this research (Ibid).

The interviewer used cards to structure and conduct the interviews. They were also used to provide the interviewees with details of the study and any definitions that needed to be clarified (Rowley *et al.*, 2012). They can also be used to review the

subjects that have been discussed and to prompt any comments on topics that may have been overlooked.

The interview was designed to add a more reflective understanding of the survey results. The interview was informed by the research aim and questions, the literature review and the survey analysis results. The interview guide was organized into three areas: the interviewees' view about each variable, rank the variables from first important to less important and their views regarding the survey results mainly the insignificant results (see appendix D). For example, the interviewees were asked to rank the variables from the most important one to least important one with regard to how they trust and use mobile banking apps. This will help to confirm the hypotheses tested by the survey. Furthermore, the interviewees were asked to justify the order in which they placed the variables. This will help to collect detailed data regarding how their trust and use of mobile banking apps are informed by the investigated variables. Therefore, the explanation of the survey results and the understanding of how participants' perceptions on using mobile banking apps would be more valuable.

4.9.2 Sampling and population

The strategy used for sampling can follow a number of different designs. In the case of qualitative research, the most common strategies are either criteria based or theory based (Ritchie *et al.*, 2013). In the former, the researcher selects a series of criteria with which to choose the sample for the study; these criteria are chosen because they are believed to be appropriate for answering the research questions.

In the theory-based approach, an iterative process is followed. The sample is selected then the theory applied to it; the results of this process can then be employed to test a further theory. The criteria-based approach was used in this study as it was necessary to set criteria for the selection of the participants to ensure that the information they provided would answer the research question. Three criteria were set for the selection of the participants:

1- Banking arrangement: the participants were all customers of one of the two banks selected for inclusion in the study.
2- Age: All of the participants were aged 18 or older. This was necessary as people younger than this cannot open a bank account or use the bank's mobile banking application.
3- Criteria: the participants needed to be already using the bank's mobile banking application. It should be noted that participants were not selected on gender, as both males and females were included.

4.9.3 Setting up the interview

As time was limited and the researcher was based in the UK, it was decided to choose Saudi nationals who were temporary residents of the UK. The most convenient and effective way of making contact was to send an email to the student members of Saudi student clubs at UK universities. The initial contact email provided the participants with information about the researcher and the associated educational institution. The participants were not incentive, all the interviewees were volunteers. As stated by Morse (2000), qualitative research does not have a fixed number for the participants, but rather it depends on the time and resources

available to the researcher. For this study, it was determined that 10 respondents would be sufficient. This is because the translation process into the English language needed to be accurate which is time consuming. As the researcher has limited time to conduct this research, the total number of interviewees was ten, with 6 females and 4 men. The interviewees were from the two selected banks, 5 interviewees from each bank. For ethical consideration, each interviewee has given a code, such as A1 to A10. The characteristics of the interview sample are presented in table 18.

Interviewee	**Gender**	**Age**	**Bank**
A1	Male	24	Alrajhi bank
A2	Male	35	SAMBA bank
A3	Female	27	SAMBA bank
A4	Male	31	SAMBA bank
A5	Female	33	Alrajhi bank
A6	Female	29	Alrajhi bank
A7	Female	42	SAMBA bank
A8	Female	36	Alrajhi bank
A9	Female	29	SAMBA bank
A10	Female	24	Alrajhi bank

Table 18 : characteristics of the interview sample

4.9.3.1*Pilot study for interview*

Before gathering the main interview data, two pilot studies were prepared. This process was done to ensure the validity of the interview questions. The feedback

resulted in some changes in the questions such as rewording some questions. In addition, some variable definitions were written in simple sentences – for example, situational normality is defined as "steps are normal and similar to other online or app banking".

4.9.4 Interview process

At the beginning of the interview, the researcher explained the research aim to the participants and the value of their participation. As discussed in the section on ethical considerations, the interviewees were given an information sheet to read and they signed a consent form, see Appendix (F). A simple question was used at the beginning to break the ice, asking the participants which bank they were customers of and how long they had been using the mobile application. The seven cards used during the interview each contained the definition of a variable. These cards were handed to the interviewees one at a time and they were asked to what extent and how the variable on the card would affect their trust and intention to use the mobile banking application (see appendices C and D for interview questions and card definitions). Once this had been done for all seven variables, the interviewees then placed the cards in order from those they considered to be the most important variables to those they considered to be the least, and they were asked to explain their choices. As it is difficult to write down every word said during an interview, they were audio recorded so that the researcher had an accurate record of the participants' exact words.

4.9.4.1 *Data transcription and translation*

Bryman & Bell (2007) recommend recording and transcribing interview data. A full transcription of the interview material is valuable because it will assist the researcher with understanding the main issues that emerged in the discussion, and thus support the analysis. The discussion during the interview was in Arabic language, however, the questions and the card were asked in English as the interviewees have English as second language. The interview notes and recordings were transcribed by the researcher into Arabic and then into English, taking care to ensure that the English translation carried the same semantic meaning as the Arabic original. The final transcription report therefore contained all of the data that was deemed to be relevant to the research question.

4.10 Ethical issues

As data was being collected directly from the participants, the most important ethical consideration was to disclose how this data would be used and the purpose it served. Thus, the ethical issue was considered in the two part of the data collection. The information sheet that had been approved by Manchester Metropolitan University was positioned on the first page of the survey and handed to the interviewees prior to their interviews. It was also very important to gain the consent of the participants to take part in the study. The survey respondents were informed about their right to withdraw from the survey and that their data would only be used for the purpose of this research.

By signing the consent form, the participants in the interview signalled that they were comfortable with sharing their views, they consented to this data being used in

the research, and they understood what they were agreeing to. They were informed at the beginning of the interview what they were expected to do. It was also acknowledged that the information being collected was confidential and sensitive, therefore the identity of the participants could not be revealed and must remain secret (Pickard, 2013). This was achieved by substituting the participants' names with code names.

4.11 Data Analysis for quantitative data

In quantitative research, various statistical methods are available for the analysis of the data. In this study, the researcher chose to employ descriptive statistics and structural equational modelling (SEM) analysis. As the name implies, descriptive statistics are employed to obtain a descriptive overview of the data while SEM analysis is employed for the testing of hypotheses (Hair *et al.*, 2010).

4.11.1 Phase One: Data Preparation and Descriptive Statistics

It is important to examine the collected data before data analysis, as suggested by Hair *et al.* (2006). By examining the data, the researcher can identify any missing data or values, determine the impact that any missing data may have, carry out any necessary coding and cleaning of the data, and identify any outlying values. This then enables the researcher to test for common method variance (CMC) and for the assumptions underlying most multivariate techniques (Hair *et al.*, 2006).

Descriptive statistical tools enable researchers to employ a small number of values to accurately describe a large amount of data (Brace *et al.*, 2012). In descriptive statistics, the characteristics that were investigated include (1) measure of central

tendency (for example, mean); (2) measures of variability (for example, standard deviation); and 3) tables, charts and graphs that use categories to summarise the data.

4.11.2 Phase Two: Structural Equational Modelling (SEM)

SEM is one of the most widely used statistical analysis methods in quantitative research and it consists of a series of statistical techniques (Kaplan, 2008). It is particularly common in social and behavioural sciences for the explanation of theoretical models (Janssens *et al.*, 2008). SEM was initially introduced in the field of marketing, and has expanded to become one of the most widely employed multivariate data analysis techniques in different studies. Its most common use is for the testing of hypotheses and for carrying out measurements (Bagozzi and Yi, 1988). The principle features of SEM are that it uses latent variables, can be adapted to account for measurement error (Janssens *et al.*, 2008) and can accommodate complex relationships between one or more independent or dependent variables (Kaplan, 2008). In order to succeed with SEM, three different activities need to be combined: theoretical, methodological and statistical analyses (Byrne, 2016).

Variables can be either observed or unobserved (Hair *et al.*, 2006). It is relatively easy to measure an observed variable, and they are therefore also known as manifest, measured or indicator variables (Ibid). It is not possible to directly observe unobserved variables, which are also known as latent constructs or factors. Although they cannot be directly observed, it is hypothesised that they underlie observed variables (Ibid).

SEM also utilises exogenous variables, also known as independent variables, and endogenous or dependent variables (Hair *et al.*, 2006). Hair *et al.* (2010.p.634) state that it is important in SEM to *"test multiple interrelated dependence relationships in a single model; the interrelated relationships indicate that the dependent variable in one equation can be the independent variable in another equation".*

The two parts of SEM are the measurement model and the structural model (SM). The measurement part uses confirmatory factor analysis (CFA) to connect observed variables to latent variables while the SM connects latent variables to other variables. The SM utilises simultaneous equations and maximum likelihood estimation in order to estimate the parameters of the model (Kaplan, 2008). Anderson and Gerbing (1988) recommend employing a two-step approach to SEM analysis and this advice was followed in this study. These steps consist of firstly the measurement model and then the SM related to the dependent and independent variables.

In the social sciences, latent variables are theoretical and hypothetical constructs. SEM is therefore employed to establish whether or not the collected data supports a theoretical model (Hair *et al*., 2010). The SM should have a theoretical basis, but it is also essential that reliability and validity are measured and assessed (Ibid).

4.11.3 The Reliability of the Instruments

Reliability measures determine the internal consistency of a set of indicators of a latent construct (Hair et al., 2010), and there should be a high level of interrelation between these indicators (Hair *et al.*, 2006). The most commonly employed

indicators of the reliability of scales are test-retest reliability (temporal stability) and internal consistency (Pallant and Manual, 2010). Test-retest reliability is measured by asking the same participants to complete a questionnaire on two different occasions and measuring the correlation between the scores achieved each time. Churchill (1979, p.69) questions the use of this strategy due to the *"respondents' memories"*, i.e. the participants remember the items on the scale and reply in the same way the second time. For this reason, this method was omitted in this research. Internal consistency, on the other hand, measures whether the items on the scale all measure the same underlying attribute. Internal consistency is usually measured with Cronbach's coefficient (α) alpha. According to Churchill Jr (1979), a score $\geq$ 0.70 indicates a good level reliability, between 0.60 and 0.70 is acceptable so long as other indicators of validity are good, but the score should not fall below 0.70 (see Table 19).

Rules of Thumb for Cronbach's Coefficient (α) Alpha Coefficient Range	**Strength of Association**
< 0.60	Poor
0.60 to 0.70	Moderate
0.70 to 0.80	Good
0.80 to 0.90	Very Good
>0.90	Excellent

Table 19: The rule of thumb for Cronbach's coefficient (α)
Source: Adopted from (Hair *et al.*, 2006)

4.11.4 The Validity of the Instruments

Validity measures the degree to which the research instrument measures the constructs it is supposed to measure (Hair *et al.*, 2006). Raykov and Marcoulides (2012,p.38) and Raykov (2011:38) define validity as *"an index of critical relevance for a measurement procedure"*. It is useful to test the validity as it increases confidence in the fact that positivist methods are valuable tools in the search for scientific truth (Ibid).

Researchers who work in the field of social sciences aim to gain an understanding of real-world phenomena through the relationships between the constructs being investigated. Therefore, it is important to measure the reliability and validity of the research instrument otherwise the research will not be considered to be scientific (Raykov and Marcoulides, 2012). These two measurements have therefore attracted a great deal of attention among social science researchers in the last one hundred years (Ibid). It is therefore important that measures in social science research illustrate discriminant and convergent validity. As stated by Straub *et al.* (2004p.383) *"If validation of one's instrumentation is not present or does not precede internal validity and statistical conclusion validity, then all other scientific conclusions are thrown into doubt".*

4.11.5 Construct Validity

The majority of the score related to validity is concerned with construct validity, which measures the hypothetical constructs being investigated (Kline, 2015). It is therefore essential to measure construct validity when developing and testing

theory. High construct validity increases confidence that the measures of an item on a scale can be taken to be representative of the actual score that would be found in the target population (Hair *et al.*, 2006). There are three aspects to construct validity: convergent validity, discriminant validity and nomological validity (Ibid). These are summarised in Table 20.

Type of Validity		Cut-off value	Source
Convergent Validity: This measures the degree to which indicators of one construct converge or have a high percentage of common variance. Convergent validity is evidence that there is correlation between the scale and other known measures of the concept.	Factor Loading: - High factor loadings show that there are common points of convergence between the indicators. Average Variance- Extracted (AVE): - This is the average percentage of variation between the items of the scale. - It summarises the degree of convergence between items that represent a latent construct.	0.50 0.50	(Hair *et al.*, 2006)
	Composite Reliability: - This evaluates the measurement model's reliability for each latent construct in the model. - If the construct reliability is high, this confirms the internal consistency. Internal consistency denotes that the measures all consistently represent the same latent construct.	0.70	(Hair *et al.*, 2006)
Discriminant Validity: This measures the degree to which the construct is different to other constructs, i.e. that it does not reflect an already existing variable.	- If discriminant validity is high, then this confirms that the construct is unique and does not measure the same phenomenon as other constructs. - AVE values and the squared correlations can be measured for two constructs and compared – the AVE should be higher than the squared correlations.		
Nomological Validity: The extent to which a summated scale can be used to accurately predict other concepts in a model that is based on theory.	- Measures the degree to which constructs correlate in the way that has been predicted by relevant theories, i.e. whether the construct's positive correlations comply with theory. -If a model is shown to have both discriminant and convergent validities, then the nomological validity is confirmed.		Hair *et al.* (2006)

Table 20: The aspects of construct validity.

4.11.6 Factor Analysis Techniques

With factor analysis, the variance of a construct can be broken down into common factors; these common factors then reflect the common elements of the construct (Hair *et al.*, 2006) . It is normally the first multivariate tool employed in analysis and enables the researcher to determine the nature of any interrelationships by recognising sets of variables that are highly interrelated. These variables are called factors (Ibid) and factor analysis can use either exploratory or confirmatory techniques. These are explained in the following section.

4.11.6.1 *Exploratory Factor Analysis and Principal Components Analysis*

Exploratory factor analysis (EFA) and principal component analysis (PCA) provide a relatively easy way of representing the complex and numerous interrelationships between normally scaled variables (Ibid). It is advised by Byrne (2016) to use EFA when it is not clear how the observed and latent variables are connected. As its name suggests, this type of analysis helps the researcher to explore the collected data and to determine the number of factors that will be required to represent the data in the best way (Hair *et al.*, 2006). EFA allows the researcher to *"determine how, and to what extent, the observed variables are linked to their underlying factors"* (Byrne, 2016,p.15)

4.11.6.2 *Confirmatory Factor Analysis*

Confirmatory factor analysis (CFA) is a multivariate tool that is used to confirm a relationship that has already been specified (Hair *et al.*, 2006). It allows the researcher to establish the extent to which the measured variables represent

the lower number of constructs. It is appropriate to use CFA when there is already some knowledge about the structure of the latent variable (Byrne, 2016) and about the relationship that is expected – it confirms relationships, hence its name (Worthington and Whittaker, 2006). As CFA is a confirmatory test of a theory's measurements, it must be conducted in conjunction with measurement theory (Hair *et al.*, 2006). The quality of the measures employed can be determined accurately if construct validity tests and CFA are used together (Ibid). Therefore, CFA was used in this study to assess the convergent and discriminant validities of the multiple-item scales.

4.11.7 Overall Measurement of Model Fit

The next phase of the analysis is the specification of the measurement model. The purpose of this stage is to assess whether the causal relationships are accurately presented by the model, and whether the model fits the data. One of the most valuable evaluations that can be obtained from this analysis of the model is goodness-of-fit (GOF) (Ibid) , which confirms how well the SEM fits the sample data. By studying the fit indicators, researchers can decide whether or not the model has been specified accurately (Ibid).

4.11.7.1 *The Selection of Fit Indices*

A range of fit indices measures can be found in the current literature, to be used to assess how well the data fits the model. Each of these measures is unique. GOF indices are to be used as a kind of 'rule of thumb', providing cut-off values for what can and cannot be considered to be a good fit. They are therefore employed simultaneously (Marsh *et al.*, 2004). However, there is no particular consensus over which measure of fit is best suited to SEM (Hair *et al.*,

2006) As advised by Worthington and Whittaker (2006,p.828): "*cut-off criteria are general guidelines and are not necessarily definitive rules".* As assessment theories underlie SEM, ensuring a good fit is not as important as testing theories (Hair *et al.*, 2006) .

Raykov and Marcoulides (2012) state that each different index represents one component of the fit of a proposed model. Therefore, GOF measures should be based on more than one index – multiple GOF indices should be employed when deciding whether or not a model is acceptable and should be rejected or retained (Ibid). In fact, Hair *et al.* (2006) suggests that using multiple fit indices will help to ensure that an accurate model is not rejected.

In SEM, the chi-square (χ2) statistic is normally cited to indicate the general model fit (Worthington and Whittaker, 2006). However, the (χ2) value increases with a rising sample size, and it tends to be larger with increasing numbers of observed variables (Worthington and Whittaker, 2006). Model fit may thus be better estimated with other fit indices (Kline, 2015), which may be divided into different categories: absolute fit measures, incremental fit measures and parsimonious fit measures (Kline, 2015). This study follows the suggestion of Kline (2015) with regard to the minimum series of fit indices to be reported. Table 21 provides a description of the GOF measures used in this study.

Symbol	Cut-off Point	Source
(χ2)	It is not usual to use the (χ2) GOF test as the only GOF measure	Hair *et al.* (2006)Hu and Bentler (1998)
GFI	Values ≥.90 indicate a good model fit. However, its usage has become less common as other fit indices have been developed.	Hu and Bentler (1998)
RMSEA	Values <.06 indicate good model fit; value <.08 indicates reasonable fit; <.10 indicates poor fit.	Hu and Bentler (1998))
TLI	≥.90	Hu and Bentler (1998)
CFI	≥.95	Hu and Bentler (1998)
AGFI	≥ .90	Hu and Bentler (1998)
χ2:df	A higher value indicates a worse model fit, but benchmark scores have still not been established to confirm an acceptable fit.	Kline (2015)

Table 21: The GOF measures

4.12 Qualitative data analysis

Braun and Clarke's (2006) analysis was applied in relation to the thematic analysis. This is the most adopted method in qualitative analysis because of its flexible nature, given that it needs less time and is easy to use (Braun and Clarke, 2006). This method may be applied with several types of qualitative data with numerous objectives. Consequently, thematic analysis often involves a combination of other implicit and explicit data analysis methods, including narrative analysis, grounded theory and IPA (ibid). It is stated by Brian and Clarke (2006) that when utilising this method, the principal objective is to identify a definition and understand answers. The utilisation of this method assists researchers in developing their analysis from a general reading of the data to find patterns and develop themes. Nevertheless, while applying thematic analysis, the primary objective that ought to be considered is the means of identifying the themes.

In this thesis, template analysis is employed for thematically analysing texts. The researcher makes a list of codes, known as templates, that represent the themes that have been identified in the data (King, 2004). In this study, the collected data was textual only, and there was not a huge amount of data to analyse. Furthermore, the data could be managed by hard and soft copies of the transcript report. No specialist software was used for the analysis of the quantitative data as the researcher believed that inserting a machine would create unnecessary and detrimental distance between the researcher and the data (Fielding and Lee, 1998). It is suggested by Williamson and Johanson (2013) that whether or not this type of software is used will depend on the

nature of the research project and a number of other factors, for example the project size, how complex the project is, how many researchers are involved and in what form the data have been gathered.

4.12.1 Deductive Thematic Analysis

Data in deductive thematic analysis are analysed by utilising a predetermined structure. Researchers effectively apply their own data frameworks or theories; this is a particularly helpful method when there are particular research questions which pre-identify the principal themes or categorisations of data, and subsequently seek to establish the similarities and variations. Since this is a comparatively faster and straightforward method, it is exceptionally helpful in the case of resources and time constraints (Ibid). Additionally, when a predetermined thematic structure is applied, analytical adaptability is lost, which can restrict and bias the data interpretation.

4.12.2 Inductive Thematic Analysis

Predetermined framework or theory is rarely applied in inductive thematic data analysis; however, the data are applied in order to obtain the analytical framework. As the themes emanate from data in this method, they are closely associated with such data. This method is of an extensive nature and thus requires a significant amount of time. However, it is especially helpful when knowledge of the theme being studied is little.

In this research, the variables "themes" are predetermined; consequently, deductive analysis was considered. Furthermore, in order to discover further variables or sub-themes which may affect the participants' trust, the inductive

method was applied. In deductive analysis, the variables were considered as themes, and subsequently the data were classified according to each theme's "variables". For example, in information quality data, the theme was information quality and the sub-themes were determined by survey items such as information update, accuracy, reliability and relevance. However, by using the inductive method, these sub-themes were reduced to the following three: information accuracy, information updated and information completeness, since the data are more relevant to these sub-themes. Furthermore, by using the inductive approach, a new theme emerged from the analysis.

In the inductive approach, the following six steps recommended by Braun and Clarke (2006) were utilised:

1- Familiarisation with the Data

The interviews were read repeatedly to allow the reader to become immersed in the data. Initially, the transcripts were annotated manually in order to obtain the meaning and to become acquainted with the data. During this active procedure, patterns and meanings were detected and subsequently written in the margins.

2- Generating Initial Codes

Subsequently, a list of concepts was prepared which was useful in detecting factors and which produced a "codebook" (Guest *et al.*, 2011). Extracts from each code were gathered, and in order to retain context, information regarding each extract was included (Boyatzis, 1998). The coding procedure was conducted meticulously and involved the complete data set; occasionally,

extracts were included within more than one code. Furthermore, exceptions and discrepancies within the data were coded, during which procedure the codebook was developed and improved. The researcher used mind maps to code the data. Also, the research used colour coding. This was done without any software as the amount of data can be analysed by hand.

3- Searching for Themes

Subsequently, codes were classified into wider themes' "research variables" according to the relationship between the codes, as well as themes and their levels (principal themes and sub-themes).

4- Reviewing Themes

Level One: This phase's objective was to guarantee that all themes included intelligible supporting evidence and that they distinctly differed from one another.

Level Two: The complete dataset was read again, and consideration was given as to whether the data were reflected by the themes. Where data were missing from current themes, this enabled such data to be identified, and consequently the thematic maps were restructured.

5- Defining and Renaming Themes

Each theme was subject to a comprehensive analysis regarding the story told by the theme, including its association with the research question. The themes were gathered towards the research variables.

6- Producing the Report

The means by which the analysis section was recorded sought to supply an intelligible summary of the story which the data told, with information across and within themes being considered. Furthermore, a table was produced which contained variables' ranking for the purpose of assisting the researcher to detect the most and least significant variables for the participant's trust.

4.13 Chapter summary

This chapter presented the research methodology for this study. The mixed research approach was used to gather the required data in order to achieve the research aim. In addition, this chapter highlighted the research analysis technique that was used for this study. The next chapter will provide the results after analysing the data.

Chapter 5. FINDINGS AND ANALYSIS

5.1 Chapter introduction

The results of both of the strands of this research, the survey and the interviews, are presented in this chapter. The survey data was first loaded into SPSS. Then, descriptive statistics were then generated to profile the sample in terms of their demographics, and to generate descriptive statistics for the Likert scale items. Next, prior to subjecting the data to CFA using SEM, the multivariate normality, linearity and homoelasticity of the Likert scale data were assessed. Then, reliability and validity for constructs were considered. Afterwards, the measurement model and structural model were performed. To analyse the data from the interviews, thematic analysis was used. The purpose of this analysis is to obtain deep insights into the participants' perceptions. To gather these analyses, the key factors that influenced the use of mobile banking app were identified, including factors drawn from theories associated with both user adoption of technologies and trust theories.

5.2 Survey Findings

Kremelberg (2010) described descriptive statistics as statistical techniques utilised for the purpose of making the description of data simpler. This study sample's demographic features will be explored in the next sections.

5.2.1 Demographic Characteristics of the Sample

Table 22 summarises the demographic variables' frequencies and percentages. Just over half (50.3%) of the respondents were female, 52.2% were single, and the great majority – 92.2% – were Saudi nationals. 84.9% were aged between 18 and 40, with 62.5% possessing a Bachelor degree. Those who were employees and students numbered 41.4% and 41.1%, respectively.

Variable	Frequency	Percent %
Gender		
Male	318	49.7
Female	322	50.3
Marital status		
Married	306	47.8
Single	334	52.2
Nationality		
Saudi	590	92.2
Non-Saudi	50	7.8
Age		
20 or under	204	31.9
21-30	219	34.2
31-40	120	18.8
41-50	52	8.1
51 or over	45	7.0
Qualifications		
Below high school	6	0.9
High school	57	8.9
Diploma	37	5.8
Bachelor	400	62.5
Higher education	140	21.9
Occupations		
Student	263	41.1
Employee	265	41.4
Retired	2	3
House wife	56	8.8
Other	54	8.4

Table 22: Demographic Variables

5.2.2 Internet and Smartphone Experience Variables

Table 23 shows that nearly the entire set of respondents – 99.2% – used the internet on a daily basis, with entertainment being the most accessed, at 90.06%. Social media came a close second, with 90.03%, while banking was the least used – 75.3%. Education came in at 80.08%. With regard to smartphone use, 71.6% identified themselves as heavy users of smartphones; 90.06% had entertainment as the most popular use, while banking was least popular, with 71.7%.

Variable	**Frequency**	**Percent %**
Frequently of use of the internet		
Daily	635	99.2
Once a week	5	0.8
Two or three times a week	0	
Once a month	0	
Less than once a month		
Purposes for using internet		
Email	532	83.1
Social media	578	90.03
Entertainment	580	90.06
Education	523	81.7
Banking	482	75.3
Other	517	80.08
Frequently of use of smartphone app		
Always	458	71.6
Usually	71	11.1
Sometimes	111	17.3

Purposes of use of smartphone app		
Email app	482	75.3
Social media app	575	89.8
Entertainment app	580	90.06
Education	521	81.4
Banking	459	71.7
Other	521	81.4

Table 23: Internet and Smartphone Experience

5.2.3 Data Preparation and Assumptions of Normality

The first step in any analysis technique is an examination of the data. In line with Hair et al. (2010), the data was investigated by the researcher before analysis, in order to measure consistency and completeness. There are assumptions in every statistical test, so descriptive statistics have been carried out to ascertain if there is a normal distribution of the data.

5.2.3.1 *Screening and Coding the Data*

Checking for errors in the data is recommended before data analysis is carried out. There are three principal steps in data filtering: 1) Looking for errors; 2) Finding the error in the data file; 3) Remedying the error (Pallant and Manual, 2010). In line with Pallant's (2010) steps, scanning of the data took place and any errors were fixed. Having the data coded involves appointing a number to a specific response (Hair *et al.*, 2006). Furthermore, two items (EASE2, SA5) were asked in a negative way to ensure that the respondents were following the questionnaire well. Therefore, these two items were reversed to ensure consistency of direction with the other statements as answer 1 to be 7, 2 to 6,3 to5 where 4 remains.

5.2.3.2 *Non-Response Bias, Online and offline response*

It is important to obtain as high a response rate as possible to the questionnaire, in order to minimise the impact of non-response bias (Lessler and Kalsbeek, 1992). The recommendations made by Armstrong and Overton (1977) were followed in the assessment of the non-response bias in the questionnaire data. This entails making a comparison between the replies received early on in the distribution of the questionnaire and the responses received much later, to see whether there is a statistically significant relationship between them (Lambert and Harrington, 1990). The return dates of completed questionnaires were therefore used to create two groups, with the dummy variable 1 indicating ”before the second wave out” and the dummy variable 2 meaning ”after the second wave out”. According to this classification, 61% of the returns were early and 39% were late. Analysis was conducted to establish whether there was a relationship between the dummy variable and other variables, using the mean differences. No statistically significant relationships were found ($p<0.05$). In addition, as this thesis collected the survey data through offline and online methods, the mean differences for each group were used to ensure that these two methods were compatible. The result indicates statistically no significant difference between the two groups. The means values are comparable. The results for this section are in appendix (G).

5.2.3.3 *Missing Values Handling Process*

When using multivariate methods, the data must be complete, since SEM is deployed for the analysis of data, any absent data becomes a matter of great importance (Kline, 2015, Carter, 2006). Data normally go missing when there

are difficulties in entering or collecting the data (Hair *et al.*, 2003). The 'Survey Monkey' program was used, so that there could be no progression to the succeeding questions if the existing question was unanswered. Should the amount of missing values be small, then the problem can be solved by deleting the questions and/or leaving out some of the respondents, as deletion is the most well-used technique for dealing with absent data; it is also known as listwise deletion (LD) and complete-case analysis (Schafer and Graham, 2002). The LD application was therefore utilised in order to deal with the data that was missing from the survey; this involved the removal from the dataset of any record that had missing data from any variable. This is a simple system, and as this study's sample size is large, it was not difficult to take out such records; no harm resulted from deleting such incomplete data (Hair *et al.*, 2010). 190 cases were deleted, reducing the number of questionnaires used in the subsequent analysis from 900 to 710.

5.2.3.4 *Screening for Outliers*

The definition of an outlier is a case that exhibits values that are markedly higher or lower than all the others contained in a specific dataset (Byrne, 2016, Kline, 2015). Normally, when there is a sample size that is as large as the one used in this study (*n= 710*), outlier cases are anticipated and are usual (Tabachnick and Fidell, 2007). Mahalanobis distances D2 calculates how far cases are from the predictor variables' means (Tabachnick and Fidell, 2007). Consequently, to remove the outliers, Mahalanobis distance D2 was calculated through the use of SPSS, with a regression process being used for the variables. Mahalanobis distance at $p \leq .001$ is the standard for multivariate

outliers. Cases can be said to be multivariate outliers if the probability associated with its D2 is 0.001 or below. The distribution pattern of D2 resembles a chi-square, with the degrees of freedom matching the amount of variables that are contained in the calculation (Tabachnick and Fidell, 2007). The study analysis findings reveal several univariate outliers in the data; on this basis, a total of 70 cases were removed from the data, using multiple regression, thus resulting in a new data set of 640, down from 710.

5.2.3.5 *Assessing Univariate Normality*

To assess if the data has been distributed normally, descriptive statistics have been utilised. Normality thus means the data distribution's configuration for a single metric variable, and its corresponding variable with normal distribution (Kline, 2015).

There are two standards for measuring a distribution's shape: kurtosis and skewness (Hair *et al.*, 2010), these being the two means through which a non-normal distribution can occur; they can happen individually or collectively in one variable (Kline, 2015). As a result, the skewness and kurtosis values were used to determine the normality of distribution of the items.

The mean, standard deviation, skewness and kurtosis for the observed variables can be seen in Table 19. Hair *et al.* (2010) claim [± 2] to be the most often-used critical value of kurtosis and skewness tests. The limit of [± 2] is not exceeded for any of the skewness and kurtosis values of the items; descriptive statistics for study variables are shown in Table 24.

Although the skewness and kurtosis of the data suggest that it is normally distributed, the researcher encountered some difficulties in creating a

satisfactory outcome to the SEM process. For example, when the data analysis goes further with current data, the multivariate assumption is violated. It was found that non-normality may affect the assumption of multivariate normality that underlies the SEM analysis as the non-normality affects the model fit (Andreassen *et al.*, 2006, Hayduk *et al.*, 2007). Some studies point out that normality should be assessed with additional tests to judge data normality (Andreassen *et al.*, 2006, Hayduk *et al.*, 2007). Therefore, additional assessments of normality of the data were undertaken. The Kolmogorov-Smirnov[a] and Shapiro-Wilk tests were used. The results in Table 25 showed that the data are all non-normal at $p<.05$. Therefore, the recommendation of Andreassen *et al.* (2006) to transform the data was used to avoid the non-normality issue. The data was transformed using the log function. All the variables were named by doubling the number next to the variable name; for example, USE11, EASE11. These data were taken forward in the next analysis stages. The descriptive statistics after transformation are displayed in Table 26

Code	Item	Mean	Std. Dev	Variance	Skewness	Kurtosis
USE1	Tasks accomplish more quickly	5.13	2.06	4.2	-0.851	-0.561
USE2	Access mobile banking app anytime and anywhere.	5.09	2.255	5.085	-0.806	-0.909
USE3	Access the required information without problems.	5.1	2.033	4.133	-0.823	-0.601
USE4	Access the required transaction without problems.	5.37	1.865	3.477	-1.042	0.008
USE5	Mobile banking app are useful.	5.69	1.882	3.542	-1.425	0.779
EASE1	Utilise little mental effort.	5.46	1.809	3.272	-1.146	0.317
EASE2	Not clear how to use the bank app.	3.12	2.042	4.168	0.582	-0.987
EASE3	Accomplish banking tasks easily	5.41	1.797	3.229	-1.086	0.219
EASE4	Easy to learn	5.5	1.833	3.358	-1.263	0.488
EASE5	Using is easy.	5.24	1.957	3.831	-0.949	-0.353
IQ1	Relevant information	4.93	2.012	4.049	-0.659	-0.825
IQ2	Reliable information.	5.49	1.873	3.508	-1.233	0.4
IQ3	Adequate information	5.08	1.937	3.751	-0.862	-0.4
IQ4	Accurate information	5.2	1.955	3.822	-0.943	-0.305
IQ5	Up-to-date information	5.36	1.992	3.968	-1.079	-0.119
FV1	Familiar through bank website.	4.24	2.253	5.078	-0.257	-1.365
FV2	Familiar through magazines, TV or newspapers.	3.58	2.383	5.68	0.19	-1.586
FV3	Familiar through using services SMS and web-based banking.	4.35	2.27	5.151	-0.368	-1.348
SA1	Statements of guarantees.	5.54	1.619	2.621	-1.07	0.419
SA2	Effective security mechanisms.	5.83	1.517	2.302	-1.46	1.587

SA3	Advances communication technologies	5.73	1.558	2.427	-1.344	1.223
SA4	Statements of guarantees are not clear.	4.03	2.32	5.381	-0.081	-1.539
SA5	Generally safe.	5.59	1.311	1.72	-1.126	1.983
SN1	Online and offline banking information are similar.	5.48	1.504	2.263	-1.067	1.017
SN2	Steps are typical of web-based mobile banking.	4.14	1.893	3.584	-0.461	-0.917
SN3	Steps are similar to those in SMS banking.	4.06	1.823	3.324	-0.373	-0.858
SN4	Interaction is typical of most mobile app.	5.33	1.43	2.046	-0.886	0.802
CT1	Vendors being dishonest in interactions	5.04	1.758	3.089	-0.877	0.107
CT2	Vendors not caring	4.97	1.848	3.414	-0.859	-0.076
CT3	Vendors not being knowledgeable when helping	4.99	1.83	3.349	-0.922	0.045
CT4	Long time to respond	4.21	1.725	2.975	-0.54	-0.438
TR1	Trustworthy.	5.51	1.33	1.768	-1.104	1.839
TR2	Keep their promises and commitments.	5.46	1.322	1.748	-1.032	1.631
TR3	Deliver benefits to customers.	5.65	1.353	1.831	-1.316	2.214
IU1	Continue to use in the future.	5.8	1.406	1.976	-1.48	2.491
IU2	Recommend others to use	5.67	1.49	2.219	-1.315	1.68
IU3	Frequently use	5.68	1.465	2.146	-1.304	1.718

Table 24: Descriptive statistics for study variables (before transformation).

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Code	**Item**	**Statistic**	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
USE1	Tasks accomplish more quickly	0.215	640	0.00	0.814	640	0.00
USE2	Access mobile banking app anytime and anywhere.	0.251	640	0.00	0.775	640	0.00
USE3	Access the required information without problems.	0.195	640	0.00	0.828	640	0.00
USE4	Access the required transaction without problems.	0.221	640	0.00	0.812	640	0.00
USE5	Mobile banking app are useful.	0.276	640	0.00	0.714	640	0.00
EASE1	Utilise little mental effort.	0.220	640	0.00	0.802	640	0.00
EASE2	Not clear how to use the bank app.	0.209	640	0.00	0.862	640	0.00
EASE3	Accomplish banking tasks easily	0.213	640	0.00	0.817	640	0.00
EASE4	Easy to learn	0.260	640	0.00	0.777	640	0.00
EASE5	Using is easy.	0.233	640	0.00	0.816	640	0.00
IQ1	Relevant information	0.189	640	0.00	0.860	640	0.00
IQ2	Reliable information.	0.249	640	0.00	0.776	640	0.00
IQ3	Adequate information	0.206	640	0.00	0.846	640	0.00
IQ4	Accurate information	0.222	640	0.00	0.823	640	0.00
IQ5	Up-to-date information	0.245	640	0.00	0.782	640	0.00
FV1	Familiar through bank website.	0.154	640	0.00	0.864	640	0.00
FV2	Familiar through magazines, TV or newspapers.	0.222	640	0.00	0.827	640	0.00
FV3	Familiar through using services SMS and web-based banking.	0.171	640	0.00	0.852	640	0.00
SA1	Statements of guarantees.	0.221	640	0.00	0.828	640	0.00
SA2	Effective security	0.249	640	0.00	0.767	640	0.00

	mechanisms.						
SA3	Advances communication technologies	0.234	640	0.00	0.788	640	0.00
SA4	Statements of guarantees are not clear.	0.165	640	0.00	0.857	640	0.00
SA5	Generally safe.	0.213	640	0.00	0.827	640	0.00
SN1	Online and offline banking information are similar.	0.206	640	0.00	0.838	640	0.00
SN2	Steps are typical of web-based mobile banking.	0.262	640	0.00	0.869	640	0.00
SN3	Steps are similar to those in SMS banking.	0.216	640	0.00	0.899	640	0.00
SN4	Interaction is typical of most mobile app.	0.222	640	0.00	0.869	640	0.00
CT1	Vendors being dishonest in interactions	0.225	640	0.00	0.863	640	0.00
CT2	Vendors not caring	0.223	640	0.00	0.855	640	0.00
CT3	Vendors not being knowledgeable when helping	0.243	640	0.00	0.847	640	0.00
CT4	Long time to respond	0.207	640	0.00	0.891	640	0.00
TR1	Trustworthy.	0.220	640	0.00	0.840	640	0.00
TR2	Keep their promises and commitments.	0.219	640	0.00	0.853	640	0.00
TR3	Deliver benefits to customers.	0.203	640	0.00	0.817	640	0.00
IU1	Continue to use in the future.	0.235	640	0.00	0.776	640	0.00
IU2	Recommend others to use	0.221	640	0.00	0.794	640	0.00
IU3	Frequently use	0.221	640	0.00	0.800	640	0.00

Table 25: Kolmogorov-Smirnova and Shapiro-Wilk tests**.**

Code	Item	Mean	Std. Dev	Variance	Skewness	Kurtosis
USE11	Tasks accomplish more quickly	0.3433	0.31736	0.101	0.205	-1.44
USE22	Access mobile banking app anytime and anywhere.	0.3317	0.33786	0.114	0.336	-1.511
USE33	Access the required information without problems.	0.3541	0.31154	0.097	0.148	-1.414
USE44	Access the required transaction without problems.	0.3163	0.29784	0.089	0.299	-1.299
USE55	Mobile banking app are useful.	0.2499	0.29786	0.089	0.762	-0.836
EASE11	Utilise little mental effort.	0.3039	0.29187	0.085	0.355	-1.214
EASE22	Not clear how to use the bank app.	0.6279	0.26084	0.068	-1.303	0.638
EASE33	Accomplish banking tasks easily	0.3147	0.29033	0.084	0.282	-1.25
EASE44	Easy to learn	0.2964	0.28888	0.083	0.466	-1.042
EASE55	Using is easy.	0.3357	0.30261	0.092	0.255	-1.314
IQ11	Relevant information	0.3846	0.30646	0.094	-0.02	-1.41
IQ22	Reliable information.	0.2948	0.29522	0.087	0.468	-1.109
IQ33	Adequate information	0.3686	0.29447	0.087	0.077	-1.267
IQ44	Accurate information	0.3425	0.30142	0.091	0.212	-1.312
IQ55	Up-to-date information	0.3079	0.3087	0.095	0.418	-1.263
FV11	Familiar through bank website.	0.4757	0.31557	0.1	-0.393	-1.242
FV22	Familiar through magazines, TV or newspapers.	0.5518	0.31586	0.1	-0.7	-0.966
FV33	Familiar through using services SMS and web-based banking.	0.4606	0.31472	0.099	-0.266	-1.301
SA11	Statements of guarantees.	0.3015	0.27697	0.077	0.255	-1.274

SA22	Effective security mechanisms.	0.2492	0.26608	0.071	0.568	-0.941
SA33	Advances communication technologies	0.2666	0.27038	0.073	0.461	-1.069
SA44	Statements of guarantees are not clear.	0.4989	0.31977	0.102	-0.472	-1.237
SA55	Generally safe.	0.3178	0.24179	0.058	-0.11	-1.063
SN11	Online and offline banking information are similar.	0.3243	0.26275	0.069	0.002	-1.189
SN22	Steps are typical of web-based mobile banking.	0.5267	0.24133	0.058	-0.605	-0.007
SN33	Steps are similar to those in SMS banking.	0.5416	0.23185	0.054	-0.732	0.263
SN44	Interaction is typical of most mobile app.	0.3611	0.24762	0.061	-0.255	-0.953
CT11	Vendors being dishonest in interactions	0.3918	0.27277	0.074	-0.178	-1.011
CT22	Vendors not caring	0.3974	0.28034	0.079	-0.157	-1.052
CT33	Vendors not being knowledgeable when helping	0.3959	0.27556	0.076	-0.131	-0.977
CT44	Long time to respond	0.5275	0.22322	0.05	-0.725	0.48
TR11	Trustworthy.	0.3338	0.23909	0.057	-0.171	-0.938
TR22	Keep their promises and commitments.	0.3449	0.23603	0.056	-0.235	-0.869
TR33	Deliver benefits to customers.	0.3039	0.24372	0.059	0.059	-0.99
IU11	Continue to use in the future.	0.2857	0.26177	0.069	0.223	-1.165
IU22	Recommend others to use	0.2869	0.26383	0.07	0.232	-1.156
IU33	Frequently use	0.2648	0.25573	0.065	0.33	-1.073

Table 26: Descriptive statistics for study variables (after transformation)

5.2.3.6 *Assessing Multivariate Normality, Linearity and Homoscedasticity*

The concluding step in inspecting the data is the process of checking which assumptions – such as normality, homoscedasticity and linearity - may be the foundations of the statistical basis for multivariate analysis (Hair *et al.*, 2010). The assumption of multivariate normality is often needed in multivariate statistical methods, because the relationships that utilise a considerable amount of variables are complex (Hair *et al.*, 2010). Under conditions of multivariate normality, the distribution of every variable under consideration is normal in regard to other variables, which means that it is essential to make sure that this maxim has been adhered to before the data are analysed. A particularly crucial assumption in the way that SEM analyses are conducted, and especially so in how AMOS is used, is that multivariate normal is the standard for data (Byrne, 2010). In this study, multivariate normality was examined through the SPSS regression programme. Norusis (2008) stated that clustering around the line of points in a normal probability plot indicates the achievement of the assumption of multivariate normality. This assumption is also fulfilled when there is normal distribution of standardised residuals. Figure 10 illustrates this phenomenon – the clustering of standardised residuals near the line in the normal probability plot. Additionally, Figure 11 discloses that there was normal distribution of standardised residuals, therefore the condition of the assumption of multivariate normality was met. A regression procedure was used to determine the assumptions of linearity and homoscedasticity. These assumptions are filled when the plot can be seen to exemplify a random scatter instead of a shape

like a funnel, or a U-shape (Norusis, 2008). These results were echoed in Figure 12, thereby also meeting the same assumptions.

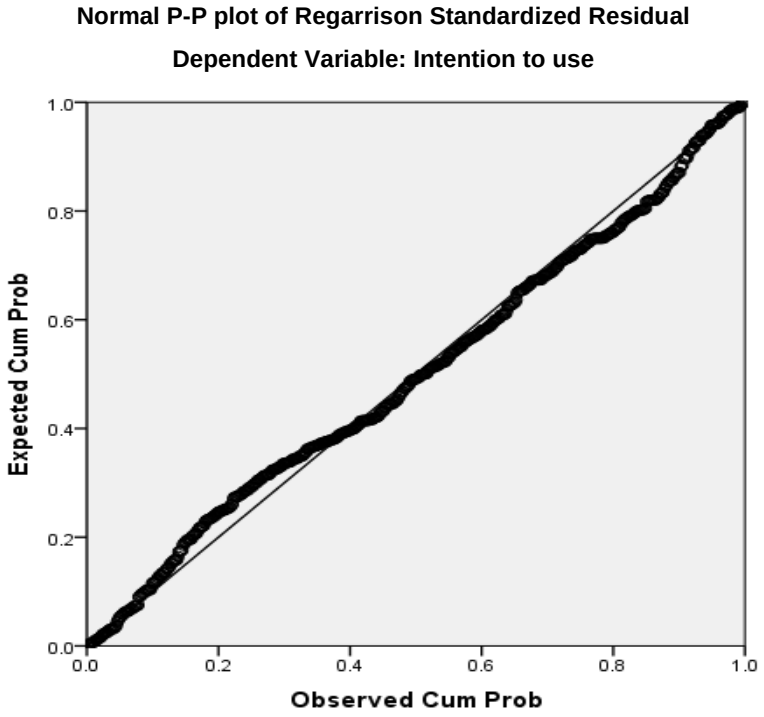

Figure 10: Normal Probability Plot of the Standardised Residuals

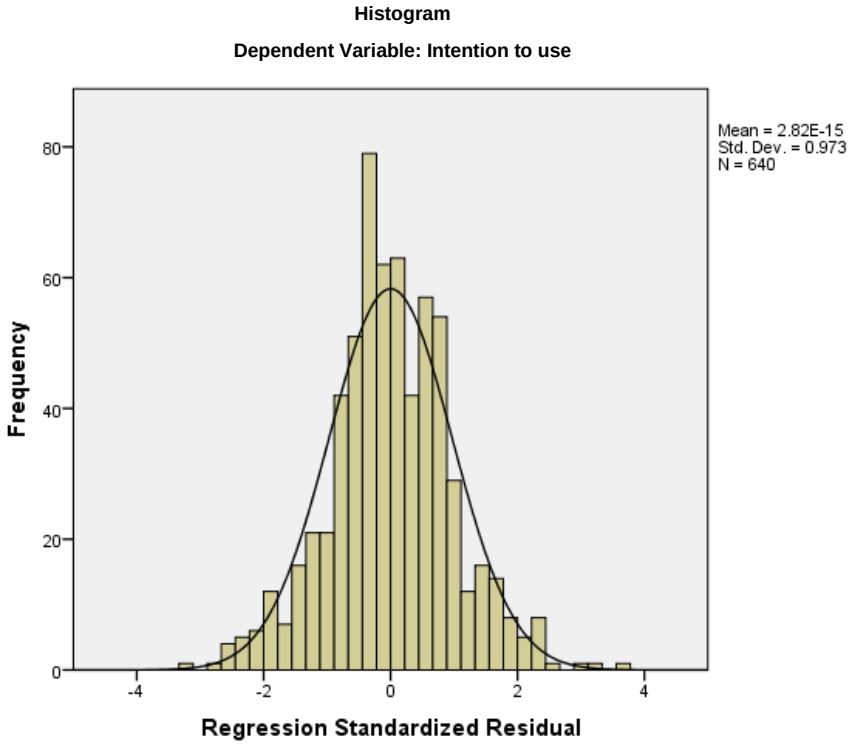

Figure 11: Histogram of the Standardised Residuals

Figure 12: Scatterplot of the Standardised Residuals by the Standardised predicted values.

5.2.4 Internal consistency for the constructs

In SPSS, Cronbach's Alpha was used to re-assess how consistent the nine constructs were. If an item had a small item-total correlation, it was deleted, as only large item-total correlations were deployed in making the nine constructs' combined measures. If the degree of reliability reaches an acceptable level – 0.70 in this case – the respondents can be said to be answering consistently (Hair *et al.*, 2003). The 0.70 acceptable reliability criterion was adopted after the example of Bernstein and Nunnally (1994), as a result of which the procedures listed below were carried out:

- Familiarity with the vendor yields a coefficient alpha value of 0.541.
- Structural assurance displays good coefficient alpha value of 0.72, but deleting item SA44 would increase it to 0.89.
- Situational normality yields a coefficient alpha value of 0.406, but after deleting SN22, the alpha became 0.561.
- Calculative-based trust shows a very coefficient alpha value of 0.745, but deleting CT44 yields an improvement to 0.9.
- Usefulness's coefficient alpha value, .89, is very good, therefore there is no need for deletion of items from the subscale.
- Ease of use's coefficient alpha value is 0.69; EASE22 is 0.48, but on removal of this item, the coefficient alpha will rise to 0.89, therefore, there is a need to delete EASE22.
- Information quality's coefficient alpha value of 0.91 is very good, so there is no need for the deletion of any items from the subscale.

- Trust's coefficient alpha value of 0.95 is very good, so there is no need for the deletion of items from the subscale.
- Intention to use's coefficient alpha value of 0.72 is very good, therefore there is no need for deletion of items from the subscale.

To conclude: following Nunnally and Bernstein (1994), alpha for the subscales exceeded the 0.70 acceptable criterion, apart from familiarity with vendor and situational normality subscale (sub-standard at 0.51). Because there is a follow-up qualitative phase in this study to validate the findings, it was decided to retain the two constructs for follow-up analysis. In addition, it was found by many researchers that values more than 0.50 can be considered as having moderate reliability for Cronbach's Alpha (Hinton *et al.*, 2004, Schmitt, 1996). Table 27 details the nine constructs' Cronbach's Alpha, together with their item-total correlations.

Constructs	N /Items	Item/Code	Corrected Item Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item is Deleted	Cronbach's Alpha	The final Cronbach's Alpha after Item Deletion
Familiarity with vendor	3	FV11 FV22 FV33	.272 .276 .446	.109 .113 .199	.533 .497 .206	.541	.541
Structural assurance	5	SA11 SA22 SA33 SA44 SA55	.714 .824 .798 -.082 .466	,580 .818 .782 .248 .593	.583 .540 .549 .898 .688	.726	.898 SA44 deleted
Situational normality	4	SN11 SN22 SN33 SN44	.236 .037 .268 .377	.225 .042 .089 .237	.324 .561 .293 .162	.401	.561 SN22 deleted
Calculative-based trust	4	CT11 CT22 CT33 CT44	. 652 . 809 .779 .017	.482 .860 .850 .005	.619 .511 .534 .904	.745	.904 CT44 deleted
Usefulness	5	USE11 USE22 USE33 USE44 USE55	.779 .667 .745 .778 .767	.610 .474 .559 .689 .664	.866 .893 .874 .867 .870	.897	.897

Ease of use	5	EASE11 EASE22 EASE33 EASE44 EASE55	.710 -.345 .727 . 718 .649	.704 .123 .715 .600 .534	.516 .891 .509 .514 .543	.891	.891 EASE22 deleted
Information quality	5	IQ11 IQ22 IQ33 IQ44 IQ55	.714 .784 .807 .793 .821	.550 .622 .658 .687 .710	.911 .896 .892 .894 .889	.915	.915
Trust	3	TR11 TR22 TR33	.893 .912 .896	.799 .832 .806	.936 .922 .934	.953	.953
Intention to use	3	IU11 IU22 IU33	.294 .684 .725	.092 .719 .726	.918 .464 .416	.727	.918

Table 27: Internal Consistency Constructs

5.3 Descriptive statistics on customers' trust and intention to use mobile banking application scale dimensions

After cleaning and checking the normality of the data, this section contains a descriptive analysis based on the items used for this research. The respondents answered questions in the constructs by choosing a number on the Likert scale which best fitted their beliefs: "1 = strongly disagree, 2 = disagree, 3 = nearly disagree, 4 = neither agree nor disagree agree, 5 = nearly agree, 6= agree and 7= strongly agree". The responses in each of these categories are reported below.

5.3.1 Usefulness

It can be seen from the table that the majority of the respondents were positive when asked about the usefulness of mobile banking application. The responses revealed that 52.8% of the respondents agreed or strongly agreed that "I can accomplish my tasks more quickly with a mobile banking app" (USE1). Although 21% of the respondents disagreed with "I can access mobile banking app anytime and anywhere" (USE2), 70% of the responses agreed or strongly agreed that "Overall, mobile banking app are useful" (USE5). Only 11.9% neither agreed nor disagreed with "I think mobile banking app permit me to access the required transaction without problems" (USE4).

Code	Item	Mean	Std. Dev	1	2	3	4	5	6	7
USE11	Tasks accomplish more quickly	0.343	2.06	11.4	5.3	3.9	10	16.6	13	39.8
USE22	Access mobile banking app anytime and anywhere.	0.331	2.255	14.5	6.7	4.2	6.4	10.8	12.3	45

USE33	Access the required information without problems.	0.351	2.033	10.2	6.9	4.2	9.8	16.6	15.6	36.7
USE44	Access the required transaction without problems.	0.316	1.865	6.9	5.2	3.4	11.9	13.8	18.9	40
USE55	Mobile banking app are useful.	0.249	1.882	7.3	4.2	3.6	4.7	9.4	18.9	51.9
Overall average		0.314	2.08	10.0	28.0	3.92	8.56	13.3	15.7	42.68

5.3.2 Ease of use

Similarly to usefulness, there is a high level of agreement between the responses regarding the ease of using mobile banking application. 60.3% of the responses agreed with the statement ”I can utilise a mobile banking app with little mental effort” (EASE1). Equally, the percentage that agreed and strongly agreed with ”I can accomplish banking tasks easily with mobile banking app” (EASE 3) and ”I can learn how to use mobile banking app easily” (EASE4) was 58.4% and 65.3% respectively.

Code	**Item**	**Mean**	**Std. Dev**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
EASE11	Utilise little mental effort.	0.303	1.80	6.3	4.4	4.2	8.6	16.3	19.4	40.9
EASE33	Not clear how to use the bank app.	0.314	1.95	6.1	4.2	4.8	9.4	17	19.5	38.9
EASE44	Accomplish banking tasks easily	0.296	1.79	6.6	5.8	2.7	6.6	13.1	25	40.3
EASE55	Easy to learn	0.335	1.83	7.8	8	3.3	9.5	13.3	21.3	36.9
Overall average		0.312	1.97	6.71	5.61	3.75	34.1	14.92	21.3	38.3

5.3.3 Information quality

In general, the information quality statements received positive answers. 61.9% agreed or strongly agreed that mobile banking app provide up-to-date information "IQ5". In addition, most of the responses were in agreement that the information provided by mobile banking app is reliable and adequate. 56.4% agreed with "I can find reliable information through a mobile banking app" (IQ2) whereas 64% agreed with "I can find adequate information through a mobile banking app" (IQ3). Despite that, only 48.8% agreed that banking app provide relevant information "IQ1", and 52.3% disagreed or strongly disagreed that banking app provide accurate information "IQ4".

Code	Item	Mean	Std. Dev	1	2	3	4	5	6	7
IQ11	Relevant information	0.384	2.012	9.5	7.5	7.5	11.3	15.5	17.2	31.6
IQ22	Reliable information.	0.294	1.873	7.8	4.1	3.4	7.5	13.1	21.7	42.3
IQ33	Adequate information	0.368	1.937	9.1	5.5	4.4	10.3	14.4	20.6	35.8
IQ44	Accurate information	0.342	1.955	30.6	21.7	17.2	9.8	6.3	4.8	9.5
IQ55	Up-to-date information	0.307	1.992	9.5	4.7	3.9	8.6	11.4	19.1	42.8
Overall average		0.335	1.982	13.3	8.7	7.28	10.99	12.14	16.6	32.4

5.3.4 Familiarity with vendor

With regard to familiarity with vendor, the responses have quite equal percentages. 44.5% of respondents disagreed or strongly disagreed with "I am familiar with my mobile banking provider through magazines, TV or newspapers" (FV2), whereas 29% agreed with this statement. 34.6% and 39.4 agreed and strongly agreed that they were familiar with mobile banking app

through SMS, web-based phone banking and banking websites (FV1) and (FV2).

Code	Item	Mean	Std. Dev	1	2	3	4	5	6	7
FV11	Familiar through bank website.	0.475	2.253	23	6.4	4.7	14.1	17.3	10.5	24.1
FV22	Familiar through magazines, TV or newspapers.	0.551	2.383	36.1	8.4	5.8	7.5	13.1	10.9	18.1
FV33	Familiar through using services SMS and web-based banking.	0.460	2.271	23	5.6	3.9	11.7	16.4	15.5	23.9
Overall average		0.352	2.782	27.3	6.8	4.8	11.1	15.6	12.3	22.03

5.3.5 Structural assurance

Responses to the statements on structural assurance were very similar to those on ease of use, usefulness and information quality. Most of the respondents (61%) agreed and strongly agreed that mobile banking app were safe as their statements of guarantees were clear ”SA1” and 69.4% agree with the statement that banking app have effective security mechanisms ”SA2”. Overall, half of the respondents felt that mobile banking is safe ”SA5”.

Code	Item	Mean	Std. Dev	1	2	3	4	5	6	7
SA11	Statements of guarantees.	0.301	1.619	3.1	3.8	3.6	14.8	13.8	21.9	39.1
SA22	Effective security mechanisms.	0.249	1.517	2.5	3.1	3.1	7.8	14.1	22.5	46.9
SA33	Advances communication technologies	0.266	1.558	3	3	3.6	8.9	15.5	21.9	44.2
SA55	Statements of guarantees are not clear.	0.317	2.321	2.2	1.4	2	5.8	38.4	18.6	31.6
Overall average		0.294	1.945	2.7	2.82	3.07	9.32	20.45	21.22	40.45

5.3.6 Situational normality

Table below shows the responses to the statements on situational normality. 49.4% of the respondents agreed and strongly agreed with the statement"The information that I am required to give when using mobile banking app is similar to that requested in online and offline banking" (SN1). However, the respondents' opinions were divided on the statement"The steps required in mobile banking app are similar to those in SMS banking" (SN3). 26.1% disagreed or strongly disagreed, whereas 39.8% nearly agreed.

Code	Item	Mean	Std. Dev	1	2	3	4	5	6	7
SN11	Online and offline banking information are similar.	0.324	1.504	3.3	2.3	4.1	7.2	33.8	15.2	34.2
SN33	Steps are typical of web-based mobile banking.	0.541	1.893	17.2	8.9	4.1	11.1	39.8	8.9	10
SN44	Steps are similar to those in SMS banking.	0.361	1.823	2.3	3.1	4.7	8.6	38	17	26.3
Overall average		0.407	1.743	7.6	4.7	4.3	26.9	37.2	13.3	23.5

5.3.7 Calculative-based trust

It can be seen that the majority of the respondents have positive opinions regarding calculative-based statements. Similar percentages agreed and strongly agreed with the statements "Mobile banking vendors have nothing to gain by being dishonest in their interactions with me" (CT1), "Mobile banking vendors have nothing to gain by not caring about me" (CT2), and "Mobile

banking vendors have nothing to gain by not being knowledgeable when helping me" (CT3) with 40% 39.8% and 38.6% respectively.

Code	Item	Mean	Std. Dev	1	2	3	4	5	6	7
CT11	Vendors being dishonest in interactions	0.391	1.758	8.1	3.6	4.4	10.6	33	14.4	25.9
CT22	Vendors not caring	0.397	1.848	10.6	3	3.4	11.4	31.7	13.4	26.4
CT33	Vendors not being knowledgeable when helping	0.395	1.813	10.5	3.1	3.3	9.1	33.4	15.3	25.3
Overall average		0.394	1.775	9.73	3.2	4.06	10.36	32.7	14.36	25.86

5.3.8 Trust

Responses to the statements on trust were very similar to those on ease of use, usefulness and information quality. Most of the respondents agreed and strongly agreed that "Mobile banking app are trustworthy" (TR1). Similar percentages (26.1% and 21.1%) agreed that "Mobile banking app keep their promises and commitments" (TR2). Overall, half of the responses (56.1%) felt that mobile banking seeks to deliver benefits to the customers (TR3).

Code	Item	Mean	Std. Dev	1	2	3	4	5	6	7
TR11	Trustworthy.	0.333	1.313	2.3	1.7	2.3	6.7	38.3	20.3	28.3
TR22	Keep their promises and commitments.	0.344	1.322	2.2	1.7	3	7.7	38.3	21.1	26.1
TR33	Deliver benefits to customers.	0.303	1.353	2.3	2.3	1.4	5.2	32.7	23	33.1
Overall average		0.342	1.346	2.23	1.9	2.2	6.6	36.43	21.4	29.16

5.3.9 Intention to use

It can be seen that the majority of the respondents have positive opinions regarding their intention to use mobile banking app. High percentages of respondents agreed and strongly agreed that they would keep using mobile banking in the future (IU1). 55.6% agreed that they would recommend others to use mobile banking app (IU2). However, 56.1% of the respondents disagreed with the statement "I will frequently use mobile banking app in the future." (IU3).

Code	Item	Mean	Std. Dev	1	2	3	4	5	6	7
IU11	Continue to use in the future.	0.285	1.406	2.8	2.2	0.3	5.3	28.7	17.5	43.1
IU22	Recommend others to use	0.286	1.419	3.3	2.3	2.8	3.8	32.2	15	40.6
IU33	Frequently use	0.264	1.465	40.5	15.6	31.6	4.7	1.9	3.3	2.3
Overall average		0.287	1.452	17.2	8.1	11.5	4.7	19.3	12.3	23.1

5.4 Common Method Variance

Common method variance (CMV) has been described as a "method of variance which refers to variance that is attributable to the measurement method rather than to the construct of interest" (Podsakoff *et al.*, 2003p.876). Common method bias is explained by the statement: "the covariance among measured items is driven by the fact that some or all of the responses are collected with the same type of scale" (Hair *et al.*, 2006,p 833). To investigate the presence of CMV bias in this study's variables, the single factor test of Harman (1967) was carried out, a process that was illustrated by Podsakoff *et al.* (2003). The single factor test necessitates that all the studied variables are subject to an un-

rotated factor analysis. CMV could be said to be present if a general factor were to account for over 50% of the covariation. In this study, the application of Harman's test to all the variables showed that there was no meaningful level of CMV (as the variance is 41.4< 50), which means that there is no reason to be concerned that this study might have common method bias. Principal Component Analysis was used to perform the Harman's test and the result is depicted in Table 28.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.663	41.402	41.402	13.66	41.402	41.402
2	3.870	11.727	53.129			
3	2.401	7.277	60.406			
4	1.667	5.052	65.458			
5	1.233	3.736	69.193			
6	.995	3.015	72.209			
7	.867	2.626	74.835			
8	.823	2.493	77.328			
9	.699	2.118	79.446			
10	.622	1.884	81.330			
11	.588	1.781	83.111			
12	.550	1.665	84.777			
13	.526	1.594	86.371			
14	.431	1.306	87.677			
15	.417	1.264	88.941			
16	.370	1.122	90.063			
17	.343	1.038	91.101			
18	.336	1.018	92.119			
19	.304	.921	93.040			
20	.271	.821	93.861			
21	.265	.804	94.665			
22	.252	.763	95.428			
23	.212	.643	96.070			
24	.192	.581	96.652			
25	.178	.539	97.190			
26	.166	.502	97.692			

27	.151	.458	98.150			
28	.144	.436	98.587			
29	.129	.390	98.976			
30	.116	.352	99.329			
31	.092	.278	99.607			
32	.068	.207	99.813			
33	.062	.187	100.000			

Table 28: Principal Component Analysis

5.5 Structural Equation Modelling

Anderson and Gerbing (1988) method has been used in this study, and the authors propose a two-step technique for carrying out SEM analysis. The measurement model is the first step, while the composition of the second step consists of the structural model that is allied to the study's dependent and independent variables. How latent variables are exemplified, as regards their affiliation to the observed indicator, is one of SEM's significant features (Garson, 2012). The initial step thus offers a foundation for determining how valid the structural theory is; it was carried out through confirmatory factor analysis (CFA), utilising connections between observed indicators and latent variables. Step two concerned dependent and independent variables, the purpose being to check the model's specified hypotheses.

5.5.1 Confirmatory Factor Analysis (CFA)

CFA was actually carried out to 'confirm' how well the study's measurement model, which results from trust and technology adoption theories, may be reproduced in a fresh data sample (Worthington and Whittaker, 2006). CFA has two steps. The first one is a measurement model test. The second one is evaluating the uni-dimensionality, validity and reliability of the measurement model. These steps are examined in the following sections.

5.5.1.1 *Measurement Model Tests*

Two principal techniques were deployed to evaluate the measurement model: 1) deliberation GOF criteria indices; and (2) evaluating the model's uni-dimensionality, validity and reliability.

5.5.1.2 *Deliberation of the Goodness-of-Fit Criteria Indices*

Goodness-of-fit, or GOF, is an element of the suitability of a model, between the sample covariance matrix and the estimated population covariance matrix (Tabachnick and Fidell, 2007). The difference between the observed values and the values that might be expected in a statistical model are expressed in GOF indices (Maydeu-Olivares and Garcia-Forero, 2010). Therefore, the chief function of the process of model fit is to work out what the GOF is between the hypothesised model and the sample data (Byrne, 2010). To express it another way, the specifications for the model were decided first, after which the model was trialled by the sample data.

Before any estimate was made of the path coefficient of the hypothesised structural model, the measurement model was subject to CFA; this included the prospective model's nine latent variables. A range of indicators, or items, were deployed to authenticate the variables' factor structure. After considering the results from Table 27, the measurement model engaged 33 items, all of which are listed with their latent variables in Table 29.

Variable number	Latent variable	Number of items	Code name
1	Familiarity with vendor	3	FV11, FV22, FV33
2	Structure assurance	5	SA11, SA22, SA33, SA55
3	Situational normality	4	SN11, SN33, SN44
4	Calculative-based trust	4	CT11, CT22, CT33,
5	Usefulness	5	USE11, USE22, USE33, USE44, USE55
6	Ease of use	5	EASE11, EASE33, EASE44, EASE55
7	Information quality	5	IQ11,IQ22, IQ33, IQ44, IQ55
8	Trust	3	TR11,TR22,TR33
9	Intention to use	3	IU11, IU22, IU33

Table 29: The Latent Variables and the Items Used in CFA.

5.5.2 The Proposed Model

The measurement model was estimated using the maximum likelihood (ML) estimation techniques provided by AMOS. To evaluate the overall model fit for CFA and SEM, six GOF indices, each describing the model fit from a different perspective, were reported for this study. The fit statistics and indices for the proposed measurement model are summarised in Table 30 while the measurement model is depicted in Figure 13. Having an average fit, the proposed model did not fit the data well. The normed chi-square (6.2), RMSEA (.09), AGFI (.70) and GFI (.76) were not within the acceptable range, while CFI (.87) was only close to the acceptable benchmarks. Chi-square = 2849.3, DF = 459.

	2/df	GFI	RMSEA	TLI	CFI	AGFI
Benchmark	<5	≥.90	<.06	≥.90	≥.95	≥ .90
Source	(Kline, 2015)	(Hu and Bentler, 1998)	(Hu and Bentler, 1998)	(Hu and Bentler, 1998)	(Hu and Bentler, 1998)	(Hu and Bentler, 1998)
Obtained	6.2	.76	.09	.85	.87	.70

Table 30: The Fit Statistic and Indices for the Proposed Measurement Model

Note: $\chi 2$ = Chi-square; df = Degree of freedom; Normed chi-square or ratio of likelihood (χ2) to degrees of freedom = $\chi 2$/df; GFI = Goodness-of-fit index; RMSEA = Root mean square error of approximation; SRMR= The standardised root means square residual; TLI= Tucker–Lewis Index; CFI = Comparative fit index; AGFI – Adjusted goodness-of-fit index.

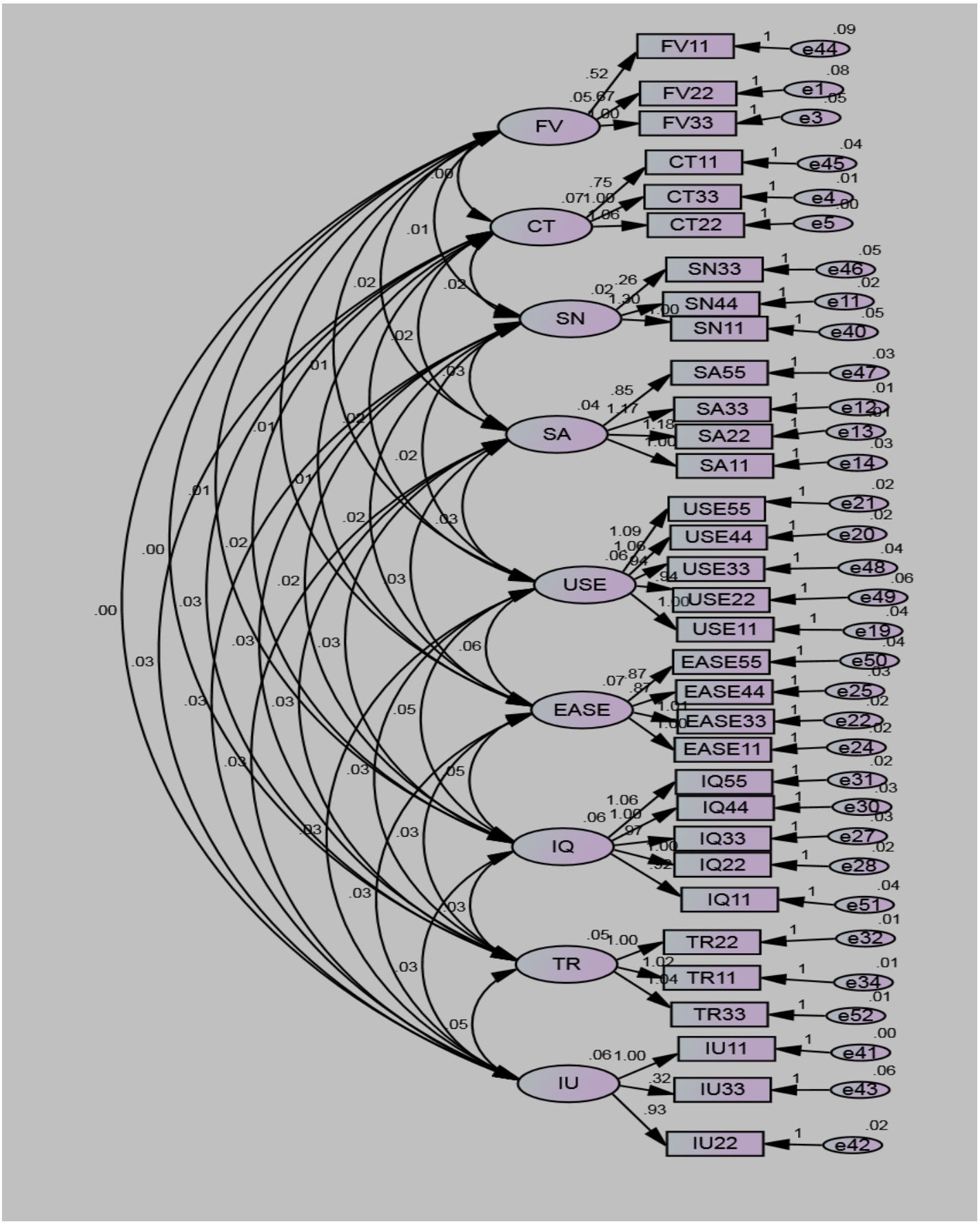

Figure 13: Standardised Coefficients for the Proposed Measurement Model.

5.5.3 The Revised Model

Since the indices for the measurement model values were below the acceptable benchmark, the measurement model was revised. Accordingly, modifications were based on three criteria. First, only indicator variables with standardised factor loadings (SFL) above .50 were retained (Hair *et al.*, 2010). Second, indicator variables whose squared multiple correlations (SMC) were below .30 were dropped. Third, indicator variables with high modification indices (MI) were deleted, as this indicated that the variables were cross-loading onto other constructs (Byrne, 2010). Based on these criteria, several items were deleted. Table 31 presents the deleted items. The revised model is presented in Figure 14.

Item deleted	Reason for deletion	SMC	SFL	ML
FV11: Familiar through bank website.	Squared multiple correlation below .30 standardised factor loadings < .50	0.14	0.3	
SN11: Online and offline banking information are similar.	Squared multiple correlation below .30 standardised factor loadings < .50	0.03	0.17	
IU33: Continue to use in the future.	Squared multiple correlation below .30 standardised factor loadings < .50	0.09	0.3	
TR33: Deliver benefits to customers.	High loading to SA55.	-	-	178.15
CT11: Vendors being dishonest in interactions	High loading to SA55.	-	-	46.03
SA55: Generally safe.	High loading to IU,TR	-	-	30.14
USE22: Access mobile banking app anytime and anywhere.	High loading to SA55	-	-	86.09
USE33: Access the required information without problems.	High loading to SA55			37.06
EASE55: Using is easy.	High loading to IQ11	-	-	66.3
IQ11: Relevant information	High loading to EASE55			52.8

Table 31: Items Deleted from the Proposed Measurement Model

The fit indices for the final model are summarised in Table 32, and the revised model fits the data well. The normed chi-square was below FIVE, the RMSEA was equal to the cut value (.06), and the AGFI, CFI, and TLI values were within the acceptable benchmarks. Additionally, all standardised loading of items were .50 and above, and all items' critical ratios (*t*-value) were greater than 1.96. Furthermore, the standard residual values were less than (± 2.5) as recommended by Hair *et al.* (2010). Therefore, all loadings were statistically significant and in the predicted direction. Table 33 demonstrates SLF, CR and SMC for the variables. CHI-SQUARE = 627.23.

	χ2/df	GFI	RMSEA	TLI	CFI	AGFI
Benchmark	< 5.00	≥.90	<.06	≥.90	≥.95	≥ .90
Obtained	3.3	0.92	0.06	0.95	0.96	0.90

Table 32: The Fit Indices for the Final Model

Note: *χ2* = Chi-square; df = degree of freedom; Normed chi-square or ratio of likelihood (χ2) to degrees of freedom= *χ2*/df; GFI = Goodness-of-fit index; RMSEA = Root mean square error of approximation; SRMR= The standardised root means square residual; TLI= Tucker–Lewis Index; CFI = Comparative fit index; AGFI – Adjusted goodness-of-fit index.

ITEM	SLF>.5	SMC	C.R>1.96
CT22: Vendors not caring	1.014	1.028	27.214
CT33: Vendors not being knowledgeable when helping	0.909	0.825	*
EASE11: Utilise little mental effort.	0.893	0.798	*
EASE33: Accomplish banking tasks easily	0.915	0.837	36.037
EASE44: Easy to learn	0.739	0.546	23.506
FV22: Familiar through magazines, TV or newspapers.	0.692	0.479	7.445
FV33: Familiar through using services SMS and web-based banking.	0.486	0.31	*
IQ22: Reliable information.	0.881	0.776	24.275
IQ33: Adequate information	0.809	0.655	23.096
IQ44: Accurate information	0.838	0.702	*
IQ55: Up-to-date information	0.833	0.694	29.685
IU11: Recommend others to use	0.962	0.926	*
IU22: Continue to use in the future.	0.881	0.777	37.232
SA11: Statements of guarantees.	0.75	0.563	*
SA22: Effective security mechanisms.	0.891	0.793	24.164
SA33: Advances communication technologies	0.894	0.799	21.021
SN33: Steps are similar to those in SMS banking.	0.577	0.333	*
SN44: Interaction is typical of most mobile app.	0.795	0.632	15.648
TR11: Trustworthy.	0.952	0.907	44.413
TR22: Keep their promises and commitments.	0.92	0.847	*
USE11	0.743	0.552	*
USE44	0.877	0.769	23.248
USE55	0.907	0.823	24.169

Table 33: SLF and SMC.

Note: (*) *t*-values for these parameters were not available because they were fixed for scaling purposes. SFL = Standardised factor loadings, SMC = squared multiple correlations

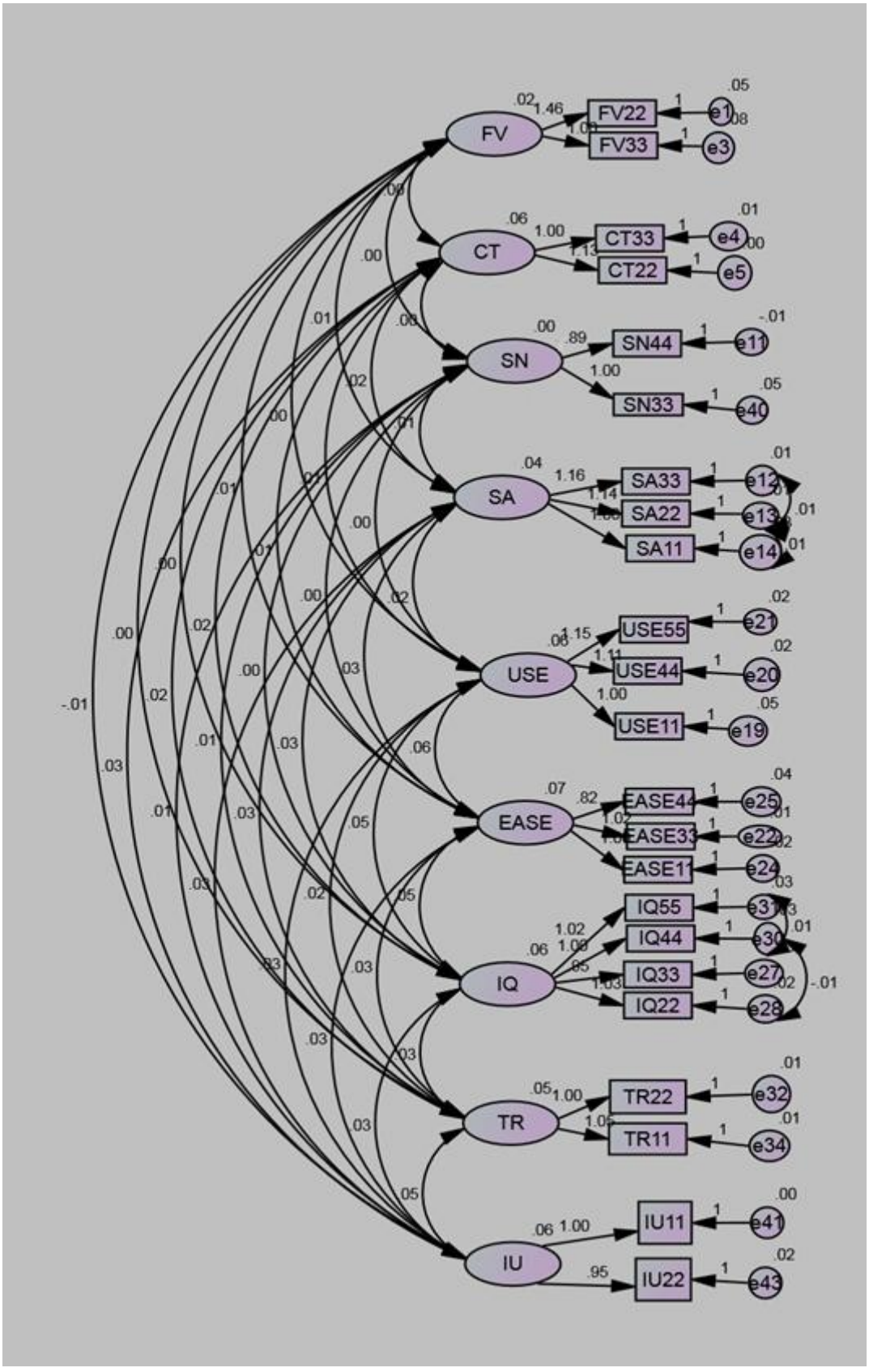

Figure 14: Revised Model.

5.6 Evaluating the Uni-dimensionality, Validity and Reliability of the Measurement Model

Accurate investigations from Straub (1989) reveal that a dearth of validated measures in confirmatory research leads to the position that none of the individual findings in a study can be regarded as trustworthy. Consequently, before evaluating the study's structural model, there must be a good level of uni-dimensionality, reliability, and convergent validity present in the measured model.

5.6.1 Uni-dimensionality

The presence of uni-dimensionality means that a single foundational construct serves to explain a group of measured variable indicators; this is especially so when there are more than two constructs that are active in the model (Hair *et al.*, 2010). As Hair *et al.* (2010:696) clarify, *"each measured variable is hypothesised to relate to only a single construct"*. In order to measure uni-dimensionality, tests for CFA and internal consistency were carried out on every construct. The results, following the recommendation of Hair *et al.* (2010), identified whether there was any cross-loading; if so, as shown in Table 29 and Table 31, such items were deleted.

5.6.2 Reliability of Constructs

To assess the constructs' reliability, both the composite reliability (CR) and the average variance extracted (AVE) were utilised, constructs being considered reliable when CR surpasses the 0.6 criterion, as mooted by Hair *et al.* (2010), and the yield of average variance surpasses 0.5. Table 34 illustrates that the

constructs' estimation values were all higher than the suggested cut-off point except familiarity with vendor with 0.4; however, the composite reliability surpassed the 0.60 criterion with 0.62. Thus, the familiarity with vendor achieved reliability. This signalled high levels of reliability and internal consistency in measurements of the model's relationships, thereby indicating good construct validity, in line with the recommendations of Hair *et al.* (2010). As the extracted values of average variance were higher than 0.5, the constructs could consequently be considered as reliable.

Construct	**AVE >.5**	**CR>.6**
Familiarity with vendor	0.4	0.62
Structural assurance	0.72	0.9
Situational normality	0.5	0.64
Calculative-based trust	0.92	0.96
Usefulness	0.71	0.9
Ease of use	0.7	0.8
Information quality	0.71	0.9
Trust	0.8	0.93
Intention to use	0.6	0.8

Table 34: Reliability of Constructs**.**

NOTE: CR = composite reliability and AVE = average variance extracted

5.6.2.1 *Convergence of Constructs*

The capacity to calculate the construct validity of the prospective measurement theory is one of CFA's major benefits (Kline, 2011; Hair *et al.*, 2010). In the event of standardised factor loadings with statistical significance reaching 0.50, and when squared multiple correlations exceed 0.30, constructs achieve

convergent validity (Hair *et al.*, 2010). Table 33 results show that every factor loading had statistical significance and exceeded 0.50, while each squared correlation surpassed 0.30. The measures therefore displayed convergent validity.

5.7 Structural Model Assessment and Hypotheses Testing

Having confirmed the measurement model fit and appraised the constructs' validity, trialling the structural model was the next step, a process that involved assessing the hypothesised theoretical model and the inter-connections of the latent constructs, these being the variables in SEM that are of prime interest; they are not calculated directly, being unmonitored variables, gauged by their specific indicators. Latent constructs in an SEM may be either exogenous or endogenous: the former are classed as independent variables in any equation in which they do not have a prior causal variable. They can be linked to similar exogenous variables – in the case of correlation, through a double-headed arrow, or in the case of causation, through a single-headed arrow. They cannot, however, be linked to both (Kline, 2015). The other types of latent construct – endogenous – are variables that are dependent on a minimum of one equation (Garson, 2012). Attention at the stage of the structural model shifts from the bonds connecting latent constructs and measured variables to the essence and extent of the inter-connecting bonds of constructs (Hair *et al.*, 2010). The constructs were therefore attached to each other and the type of attachment was detailed before the model was run. The eight hypotheses are denoted in Table 35 by causal paths that served to check the latent constructs' relationships.

Construct	Hypotheses	Relationships
Trust	H1	Trust -----> Intention to use.
Familiarity with vendor	H2	Familiarity with vendor -----> Trust.
Calculative-based trust	H3	Calculative-based trust -----> Trust.
Structural assurance	H4	Structural assurance-----> Trust.
Situational normality	H5	Situational normality -----> Trust.
Usefulness	H6	Usefulness -----> Trust.
Ease of use	H8	Ease of use -----> Trust.
Information quality	H10	Information quality -----> Trust.
Usefulness	H7	Usefulness -----> Intention to use.
Ease of use	H9	Ease of use -----> Intention to use.
Information quality	H11	Information quality -----> Intention to use.

Table 35: Hypotheses Testing/Paths Causal Relationships.

5.7.1 Assessment of the Model Fit

Table 36 encapsulates the fit statistics and indices for the prospective measurement model, with the model being illustrated in Figure 15. The outcomes suggest that a good fit was achieved by the hypothesised structural model, the probable ratio chi-square being $\chi 2$ =734.7.05 (df = 219; p = .000), while several more fit measures indicated that the model fitted the recorded data satisfactorily. The GFI was 0.91 and the RMSEA measure .06, both suggesting good model fit, while the TLI 0.94 and 0.95 for CFI; these latter surpassed the base minimum, which meant a satisfactory fit and the 0.90 AGFI parsimony fit measurements were equal to the ≥ 0.90 cut-off point.

Additionally, the *χ2*/ df = 3.3 came in under the <5 threshold level, thereby backing up these findings.

	χ2/df	**GFI**	**RMSEA**	**TLI**	**CFI**	**AGFI**
Benchmark	< 5.00	≥.90	<.06	≥.90	≥.95	≥ .90
Obtained	3.3	0.91	0.06	0.94	0.95	0.90

Table 36: The Fit Statistic and Indices for the Proposed Measurement Model

5.7.2 Testing the Hypotheses

Table 37 shows the results from testing the hypotheses. Four of the paths had statistical significance and had the correct prediction, leaving out the causal path between usefulness, ease of use and information quality with trust. There was statistical significance, for instance, in the hypothesised path between familiarity and vendor with trust (* $p < 0.05$). The paths between situational normality, calculative-based trust, structural assurance and trust also had statistical significance (***$p<0.001$), but there was no significance in the path between information quality, usefulness and ease of use with trust. Figure 16 presents the final research hypotheses result.

	Hypotheses	Estimate	P	Result
H1	Trust -----> Intention to use.	0.999	***	Supported
H2	Familiarity with vendor -----> Trust	0.395	0.004	Supported
H3	Calculative-based trust -----> Trust.	0.113	***	Supported
H4	Structural assurance-----> Trust.	0.677	***	Supported
H5	Situational normality -----> Trust.	1.381	***	Supported
H6	Usefulness -----> Trust.	0.729	0.297	Not supported
H7	Usefulness -----> Intention to use.	0.474	***	Supported
H8	Ease of use -----> Trust.	-0.553	0.374	Not supported
H9	Ease of use -----> Intention to use.	0.553	***	Supported
H10	Information quality -----> Trust.	-0.100	0.153	Not supported
H11	Information quality -----> Intention to use.	-0.742	0.458	Not supported

Table 37: Testing Hypotheses.

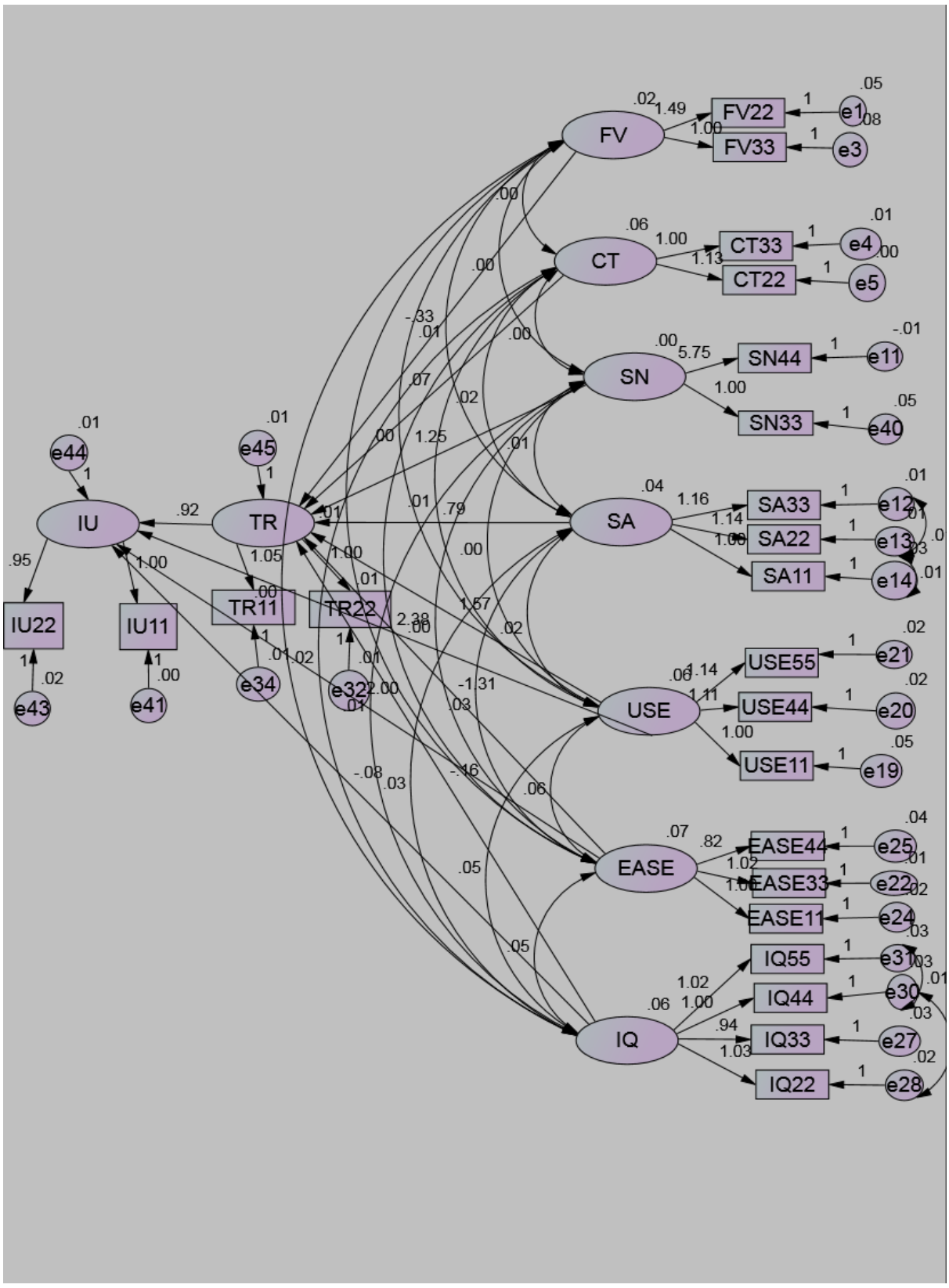

Figure 15: Standardised Coefficients for the Final Structural Model.

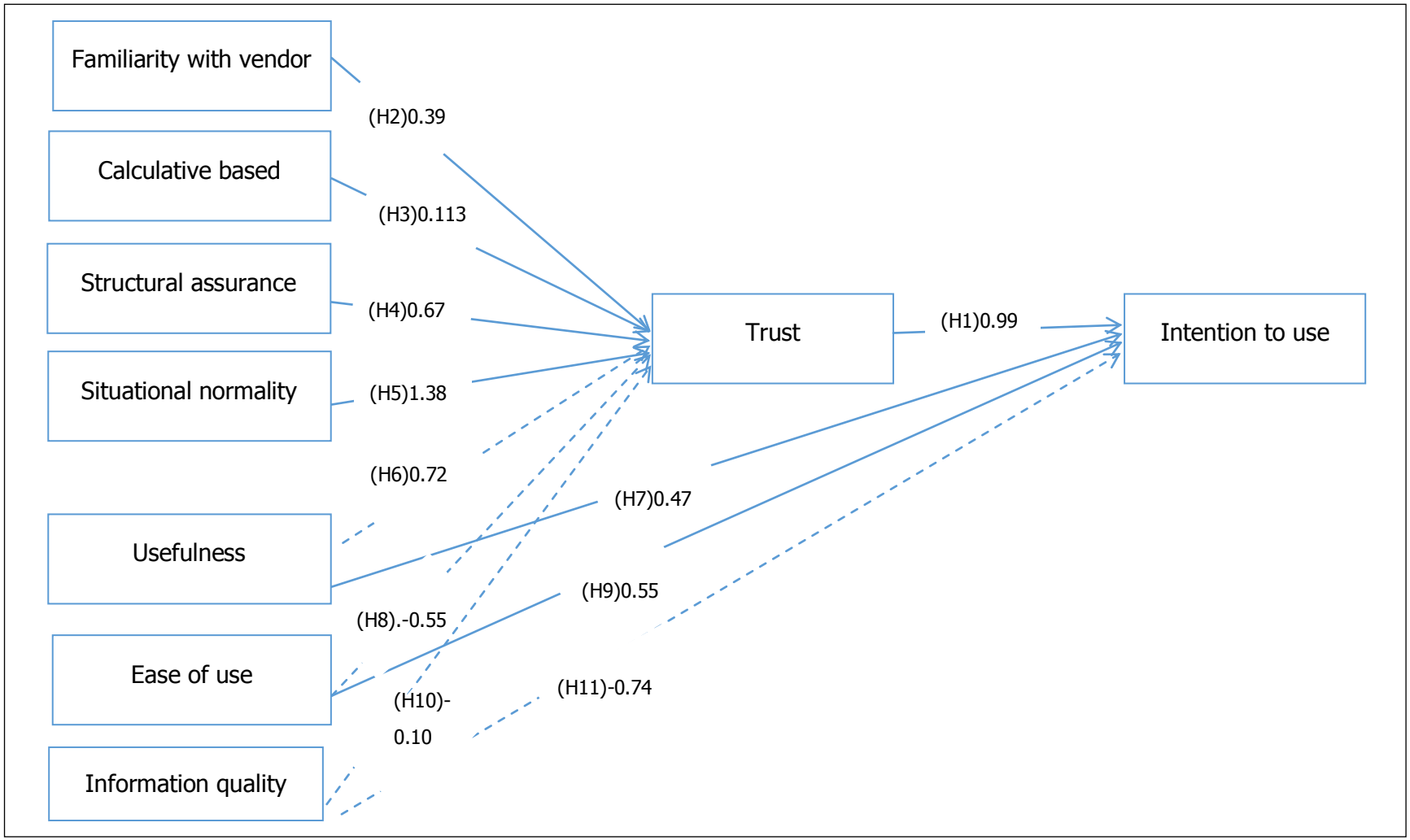

Figure 16: The final result of the research hypotheses.

Note: The dotted arrows present unsupported results.

5.7.3 Multi-group analysis

Multi-group analysis was conducted in order to verify whether or not the paths between the groups (i.e. age, gender, marital status, qualifications and occupation) were significantly different. If significant differences exist, this implies that the moderator influences the strength and direction of the path (Hair *et al.*,2010). Sample was divided into desired groups (sub-sample) and the path/relationships of the independent variable(s) are regressed with the dependent variable for each sub-sample. The fit statistics for each model are deemed to be acceptable. Table 38 below describes the fit model for each sub-sample. Then, a comparison between the chi-square differences between each sub-group was performed, and these differences are presented in Table 39. From this table, all the sub-moel are within the acceptable level of the fit statistic indices. Therefore, the SEM for each sub-model were applied. The hypothesis tested for each subgroup is in appendix (H).

Fit statistics	***χ2/df < 5.00***	***GFI ≥.90***	***RMSEA <.06***	***TLI ≥.90***	***CFI ≥.95***	***AGFI ≥ .90***
Gender						
Male	2.5	0.92	0.05	0.91	0.95	0.91
Female	3.1	0.90	0.06	0.93	0.97	0.92
Marital status						
married	3.1	0.91	0.05	0.92	0.96	0.90
single	3.3	0.90	0.06	0.91	0.97	0.91
Age						
20 or less	2.5	0.91	0.06	0.91	0.96	0.90
21-30	3.2	0.91	0.06	0.92	0.95	0.92

31-40	3.9	0.93	0.05	0.92	0.95	0.92
Qualifications						
Bachelor	3.4	0.91	0.05	0.93	0.95	0.91
Higher education	3.9	0.93	0.05	0.94	0.97	0.91
Occupations						
Student	2.9	0.92	0.06	0.95	0.96	0.92
Employee	3.7	0.91	0.07	0.95	0.95	0.90

Table 38: Fit model for each sub-sample

.

Model	**DF**	**CMIN**	**P**	**NFI Delta-1**	**IFI Delta-2**	**RFI rho-1**	**TLI rho2**
Gender	14	11.625	.636	.001	.001	-.002	-.002
Marital status	22	16.652	.782	.001	.001	-.003	-.003
Age	50	45.173	.667	.003	.003	-.006	-.006
Qualifications	52	45.412	.729	.003	.003	-.007	-.007
Occupation	22	17.369	.743	.002	.002	-.003	-.004

Table 39: Nested model comparison AMOS output.

Note: CMIN and DF are the final values computed from the differences between the two subgroups

5.8 Interviews

The focus of this thesis is the role of trust dimensions and adoption variables in customers' overall trust and use of mobile banking apps in Saudi Arabia. The research model was first developed by examining the extant literature and theories in depth (see Chapter 3). It was then validated with quantitative data

collected from Saudi bank customers (see previous sections). This quantitative data led to interesting questions about the nature and extent of the relationship between customers' trust and the use of mobile banking apps and how trust types and adoption variables influence this relationship. In addition, the results also showed unexpected findings regarding the role of adoption variables in customer trust. These findings, combined with the benefits of the mixed methods discussed in Chapter 4, provide in-depth explanations of the issues at the centre of this research, and they motivated the researcher to carry out further explanations of the research model relationships with qualitative methods in order to improve the survey validity and the findings.

According to Miles and Huberman (1994, p. 10), the fact that qualitative data emphasises "naturally occurring, ordinary events in natural settings" is one of its major advantages, as this provides the researcher with insights into real life. Qualitative data can be used effectively to supplement, validate, explain, or clarify data that has been collected from the same setting with quantitative methods (Miles and Huberman, 1994).This section presents the findings based on the interviewees' answers.

The qualitative phase contributes to this thesis by providing a rich picture of the relationships between the variables in the quantitative part. It offers customers' perceptions and experiences with regard to their trust and use of mobile banking apps in Saudi Arabia. The findings help to develop on understanding of participants' point of view regarding the research variables. As some of the hypotheses tested in the quantitative phase were statically not significant, the outcomes from this part will help to interpret these results. Moreover, the

contribution of the qualitative phase is to understand deeply any further contextual factors that might impact customer trust and the use of mobile banking apps.

As already explained in section 4.9.1, a number of data sources were used to inform the interview questions, such as the research questions and aims, the review of the literature and the data gathered through the questionnaire. The interview questions were formulated by acknowledging issues that had emerged from the survey analysis, and the interviews allowed the researcher to investigate in further depth the participants' perceptions of the use of mobile banking apps. Three areas were covered by the interview questions: the participants' views about each study variable, how they ranked them and their interpretations of the insignificant quantitative results.

Ten participants were interviewed using semi-structured interviews with a card-based approach (see section 4.9). The characteristics of the sample were presented in section 4.9.3. Also, as stated in section 4.12, thematic analysis with template analysis was used to analyse the qualitative data. The themes identified are the research variables that this thesis aims to test and examine. The next section will present the variables as they were ranked by the participants. Then, the findings related to each theme (variable) will be demonstrated and supported with participants' quotes.

5.8.1 The relative importance of factors influencing the use of mobile banking app

After each interviewee explained his/her perception about the research variables, the interviewees were asked to order the cards from the most

important to the least important card. This process offers an insight into the relative importance of the variables that affect customer trust and therefore their intention to use. In addition, comparing between the two results (survey and interview)- in term of which variable is more or less important- will increase the understanding of mobile banking app customer use. Table 40 illustrates the interviewees' rankings for the cards. The ranking is from 1 to 7 and the number under each rank is represent how many participants choose this factor. For example, it can be seen from the table that structural assurance is considered to be the most important factor as 10 participants choose to rank structural assurance to be first important factor. On the other hand, usefulness and ease of use take the lowest rank as seven and ten participants choose usefulness and ease of use to be in 6 and 7 ranks. Moreover, information quality and situational normality occupy the second rankings, whereas calculative-based trust and familiarity with vendor have taken the middle range of the ranking. Furthermore, a new factor arose from the interviews. This factor is called "bank agility". Bank agility concerns the extent to which the bank is aware of the importance of synchronising the bank app with the smartphone software system, in addition to how aware the bank is of any security issues and whether it alerts customers about risk situations. In general, 17 sub-themes arose from the data. Table 41 presents the outcomes from the interviews. The next sub-section will provide details of the findings. The order of the sub-sections follows that of the examined variables in Chapter3.

	Number of participants chose specific ranks(1-7)						
Factor	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Familiarity with vendor (FV)			4	2		4	
Calculative-based trust (CB)			2	3	3	2	
Structural assurance (SA)	10						
Situational normality(SN)	1	7	2				
Usefulness USE)	3					2	5
Ease of use (EASE)						9	1
Information quality (IQ)	7	3					

Table 40: Ranking of factors effecting trust.

Main theme	Sub-theme
Familiarity with vendor	Experience and knowledge with the vendor
Calculative-based trust	Bank's reaction Acknowledgement of requests for help
Structural assurance	Security of guarantee statement Regulations clarity Security mechanism
Situational normality	Similar login steps Advanced access
Usefulness	Quick access Quality of app services
Ease of use	Easy access App Clarity
Information quality	Information accuracy Information updated Information completeness
Bank agility	iOS, android software synchronisation Alerts customer about risk situation

Table 41**:** Key themes and sub-themes emerging from the data.

5.8.2 Familiarity with vendor

The familiarity with vendor card was in the middle range. The theme of familiarity with the vendor included one sub-theme. This described the participants' general experience and knowledge about the mobile banking vendor and how this was important for their trust.

5.8.2.1 *Experience with and knowledge of the vendor*

Customer experience was seen as the most common sub-theme across the participants. They reported that their online bank and mobile banking experience with the same bank would affect their trust. Based on this experience they can judge their trust. For instance:

"I had an account with my bank for a long time. The experience overall has satisfied me thus I use and trust the app" interviewee A5*.*

"I had a good experience with them in general, not just for me ... I do online banking and telephone banking with my bank and they are good and I feel the same with the app and I know that my bank would treat me the same when I used the app" interviewee A8*.*

At the same time, a long relationship with the bank was seen as critical for their trust.

"I have a long relationship with my bank … their online communication, the website and mobile banking are good, so I thought the app would be similar" interviewee A1*.*

5.8.3 Calculative-based trust

Calculative-based trust was in the middle range of the ranking. The participants agreed about the importance of calculative-based trust. Two sub-themes were generated from the interviewees regarding calculative-based trust. These themes described how the bank reacted to and acknowledged any case that the interviewees challenged**.**

5.8.3.1***Bank's reaction***

The participants claimed that the bank's reaction and response to their requests regarding the app was important for their trust in using the app. Some participants explained that this showed that the bank was confident with its app and would lose if customers did not trust the app. Other participants made the point that the response time was also important. The participants felt that a slow response meant that the bank did not care about the customer. Hence, more explicitly, the bank was not concerned about its customers' trust.

"I will consider my bank's reaction to app issues and how they communicate regarding this issue – do they really care about the issue or do they know what to do! Because this means my bank is caring about my trust in using the app" interviewee A3.

"In my opinion this completely depends on my bank's response and how long they take to respond to me. If they take a long time this means that the bank is not interested in gaining my trust in its service" interviewee A7*.*

5.8.3.2*Acknowledgement of requests for help*

The participants discussed whether their bank acknowledged their requests for help and how this considerably affected their trust. They explained that their feeling of trust depended on the bank fully understanding any issues surrounding the app and also being prepared for any circumstances. If the banks are willing to interact with their customers about the app, it means that the bank is keen and will not violate their customers' trust in the app.

"*I expect the bank to be fully aware about the app and what they should do … I have a feeling that I would not use the app if I had any lack of response from my bank"* interviewee A2.

"*This is very important to me because it depends on the bank knowing how to help me, if they cannot help me … I will worry about the app if my bank has no interest in gaining my trust – it's obvious that this means the app is not trustworthy*" interviewee A9.

5.8.4 Structural assurance

This was ranked by the all of the interviewees as the most important factor. Structural assurance has priority for their trust. For instance, one interviewee said, "*I would say this card 'structural assurance' is the strongest one linked to my trust*" interviewee A5. Another interviewee reflected that "*for me my trust means security and safety*" interviewee A10.

Three sub-themes were raised by the participants. These sub-themes gave details of how the participants' trust was affected by the security statements and procedures regarding the app.

5.8.4.1 *Security of guarantee statement*

Many of the interviewees linked their trust with the statement of guarantee. However, the updating concept was rising in importance in their view. They pointed out that regular updating from the bank increased their trust in using the application.

"When I log into the application I find a message from the bank that security regulations are updated and they advise me to check them" interviewee A2.

"When I see the regulation updates from time to time … this makes me feel that the app is safe and secure" interviewee A6.

5.8.4.2 *Regulations clarity*

Some of the participants reported that the clarity of the security is a main factor for their trust. The security statements should be clear and understandable in order to increase feelings of trust. In addition, easy access to the statement of guarantee would also affect trust as in the participants' view, the bank is taking into account their customer security requirements.

"*The regulations are not clear for me, sometimes I read them twice to understand them thus some time I feel the app is not secured!"* interviewee A4.

"It is hard for me to find the regulations …. I think they should be clear and easy to access" interviewee A6.

5.8.4.3 *Security mechanism*

Most of the participants commented that how the app works regarding security is vital for their trust.

The mechanisms that the banks offer to protect the app vary, according to the interviewees. For example, one bank offers SMS services when the customer carries out a transaction or even logs in to the app.

"When the bank sends an SMS to notify me of any transaction I have made through the app, this increases my security feeling" interviewee A8.

In another example, the bank allows the app to log out after a period unless the user interacts with the app. The interviewees explained this as the app protecting their account from any intrusion.

"Once I log in but do not use the app for any reason like talking to my friend, the app logs out automatically, which means for me it's safe" interviewee A1.

5.8.5 Situational normality

Most of the participants ranked the situational normality card as the second most important factor along with information quality. They believed that how the app interacts with them, as it is similar to most online and mobile application, is a considerable factor for their trust. The explanation for this is that when the app work environment is similar to that of other secured online environments, the interviewees are more willing to trust the app. For instance, one interviewee commented "*the interface and the information required are similar for most app I use and there is nothing suspicious on my bank app"* interviewee A1. However, the login procedure was the main item of interest for all of the participants with regard to their trust. For example, one participant said "*the steps to log in to my account are essential for my trust … I would link this card 'situational normality' with this card 'structure insurance' and put them in the same order*" interviewee A3.

Two main sub-themes emerged from the situational normality data. This sub-theme explains how the participants' trust was affected by the login procedure for the app.

5.8.5.1*Similar login steps*

Although the login steps seemed to be safe to the interviewees (similar to online banking) and there was nothing to mistrust in them, the steps appeared difficult for them. This difficulty did not affect their trust; however, it might affect their usage.

"I sometimes think about stopping using the app because they send a code as an SMS to log in like the same way in my online banking… I know this is more secure for my account but it is difficult" interviewee A10*.*

"I am not a heavy user of the app … the process to log in is complicated but in general this gives the impression that my bank is careful …" interviewee A6*.*

Even though similar app do not use double-check, the interviewees trust these app. The first authentication process, once the customer has downloaded the app and then created a user name and password, should be enough. For example:

"*it's a sensitive app, and I feel the same with Facebook etc. they all have our private information … we don't need to double-check on these!! ..."* interviewee A3.

" *… many steps I went through once I downloaded the app of course this makes me feel safe ... but now I think all that steps are meaning less … because I am double checking every time"* interviewee A7*.*

5.8.5.2*Advanced access*

The mobile app as a banking channel should be easy to log into and at the same time, it should be safe. The participants reported that the easiest and most secure login method was biometric access. App with biometric access appear to the interviewees to be safe and trustworthy.

"The double checking makes me feel safe but I think as an application on your phone it should be quick to log in" interviewee A2*.*

"Using biometrics as a log in makes me feel that the app is secure … with this I make sure no one can access my app" interviewee A4*.*

"I think the authentication should be updated and advanced … the bank should benefit from the iPhone features" interviewee A10*.*

The final point regarding the intention to use is that all the participants agreed that their trust overall is important for them to keep using the application. For example, one interviewee commented, "*I am using the app for more than three years now and as long as I trust the app and my bank I will keep using it*" interviewee A6. Their decision to continue using the application is shaped by trust and trust factors such as structural assurance and situational normality. Another interviewee commented "*the app login steps and regulations are clear and I am confident about them … once I see how the app is secure I will continue to use it"* interviewee A9*.*

5.8.6 Usefulness

Most of the participants emphasised that usefulness was one of the factors that most affected their use of banking app. However, there was an agreement

between the participants that this factor did not affect their trust. One of the interviewees described his/her feeling towards usefulness as "*something that attracts me to continue using my app … but not to trust"* interviewee A1*.* Another interviewee added "*I cannot say my trust depends only on the benefits from the app … beside the benefits I will think how my bank can protect me and if the app has strong security technologies"* interviewee A3*.*

There are two sub-themes arising from the usefulness data. These themes describe the interviewees' feelings about the app's utility and how this might affect their trust.

5.8.6.1 *Quick access*

The participants discussed quick access to the app and the app's services as one of the most important reasons to use the application and to decide to continue using it. The benefits from using the app and accessing bank accounts at any time and in any place were also the main reasons for their decision.

"*If the app consumes my time … then there is no difference between the app and website … for me the app means facilitating carrying out my transaction"* interviewee A8.

However, some interviewees pointed out that they would take into account quick access along with different factors such as situational normality in terms of advance and secure accessing.

"I agree … the app is helpful I can use it every time I want and in every place … but thinking of trust, I would put this benefit in the last order unless the accessing steps are secure and highly developed" interviewee A2*.*

5.8.6.2 *Quality of app services*

Although there was an agreement about the quality of services provided by the app being important for their use, some interviewees stated that their trust could be linked to the quality of the app services. This view was described as the bank considering customer trust by offering many features in the app and by making improvements. In addition, other interviewees reported that the more services on the app the more they would keep using it.

For example, "*if the bank is keen on gaining my trust, this means greater enhancements of the app services"* interviewee A5*.*

"The app should be more useful – the app features need to be flexible not complicated and they should provide me with valuable services, not only the basic services" interviewee A7*.*

5.8.7 Ease of use

Ease of use was important across all the participants. They agreed that the smoother and more understandable the app is, the more they will keep using it. However, regarding their trust, the majority of the interviewees stated that the ease of use would not affect their trust. Their explanation was that the app needs time or practice to understand it. For instance, one interviewee said " *… how to use the app is a time matter … and if I think about my trust and only my trust I will consider security and how the bank will treat me if I have issues*" interviewee A4.

Another view is that despite the fact that the app is easy to use, the interviewees' trust is more affected by trust factors such as situational normality and structural insurance.

"*Even if the app is easy … I have to first make sure that the app is secure and the login process is strong enough then I will think about whether the app is easy or not*" interviewee A9. Based on the ease of use interview data, two sub-themes emerged.

5.8.7.1 *Easy access*

The interviewees claimed that the app is easier to use than any banking channel. In addition, they mentioned that any difficulty with accomplishing app services or making a hard mental effort would affect their rate of use. However, most of the interviewees agreed that they were more engaged with the app if they could use it smoothly.

"I think that the app… on your mobile… should be easy and it should be quick to do banking transactions, this is vital for me" interviewee A10.

"The app is great … very easy for me to use it … I can do many things like checking my balance or making any payment simply" interviewee A4.

"At the beginning it was difficult but I got used to it and it's easy to find what I want" interviewee A2.

5.8.7.2 *App clarity*

App clarity was described by the interviewees as how clear and easy to learn the app services are. Most of the participants made the point that the app is easy to learn and has a very clear interface.

"I quickly engaged with the app and I found the app easy to learn, it is so clear" interviewee A5.

"The interface of the app is clearer and it is simpler to present the services compared with online banking" interviewee A9*.*

"When it's simple and well presented … this keeps pushing me to use the app rather than the website" interviewee A6*.*

5.8.8 Information quality

Generally, all the interviewees saw information quality as one of the most important factors affecting their trust. Three of the interviewees regarded information quality to be in line with structural assurance. The interviewees reported that the information in the app is considered to be a sign of their trust and it encourages them to continue using the app. The explanation from their point of view is that the customer will not feel frustrated until he/she sees their account information is incorrect. Then, the customer will reconsider his/her trust. In addition, the interviewees stated that their judgement only depends on the presented information as *"I can decide to trust or not based on the information I see in my account … I do not care about what is behind the app"* interviewee A1.

From the thematic analysis, information quality had three sub-themes which the interviewees reported as influencing their trust. These themes are discussed below.

5.8.8.1*Information accuracy*

The interviewees mentioned information accuracy several times. They said that the account information should be accurate and exact in order to trust the app. For example, one interviewee stated *"I will trust the app as long as the information is correct and there is no incorrect information there"* interviewee A6.

In addition, once the information is correct and all the transaction details are accurate, this increases the feeling that the app is safe and trustworthy. For instance, "*once I see my account information is accurate and in detail this makes me feel safe and everything is fine"* interviewee A1.

5.8.8.2*Information updates*

All of the interviewees stated that updated information was vital for their trust. If the interviewees saw their transactions updated immediately this increased their trust. The explanation for this was that the app was working in line with any banking channel and vice versa. Thus, the customer is convinced by his/her account details. One interviewee said, "*I can see on the app my recent transactions and there are pending transactions even if I use the ATM and this increases the app's honesty"* interviewee A9.

Furthermore, recent and frequent updates of transactions affected the interviewees' trust and made them feel safe. Indeed, once the customer sees that the app is updated and accurate, he/she will confidently carry out another transaction. For example, "*I think when I see my balance is updated … I do the next transaction without feeling unconvinced with my balance"* interviewee A7.

5.8.8.3*Information completeness*

Many interviewees reported that the account information on the app should be complete in order to increase their trust. The interviewees said that once the app has all the details of all of the transactions, that will affect the app's trustworthiness. For instance, "*when I see the transaction with all its details correct and nothing missing there … I feel that the app is guaranteed"* interviewee A4*.*

In addition, the interviewees stated that the app has all the required information they need, which means that for them the app is offering complete trusted information.

"*For every transaction I do … I can see all the details related to it … I can see how much I transfer and for who, when and whether it's already withdrawn or still pending. For this I think the app deserves my trust"* interviewee A1*.*

Regarding the intention to use and the adoption variables, it was clear between all the participants that usability factors (usefulness, ease of use and information quality) are vital for them to continue using the application. For example, one interviewee made the point "the usability of the app and what benefits it has are pushing me to use the application". In addition, the easier banking app are, the more customers will keep using the application. As one interviewee commented: "*the app is making my life easier and facilitating bank services … that's the main motivation for me to use the app for now and in the future as well"* interviewee A8*.* Also, how the information presented in term of accurate and updated is important for the participants to continue use the app.

5.8.9 Bank agility

During the interviews, a new factor was raised by many interviewees. This factor affects their trust. The participants mentioned that when the bank is aware of a new technology update for the phone software and they enhance their application based on that update, this will increase their trust and confidence and their willingness to continue using the application. In addition, security threats faced by the country were part of the interviewees' consideration of trust. They believed that the bank should know about any threats to their system. Two sub-themes resulted from the bank awareness variable.

5.8.9.1 *iOS, android software synchronisation*

Most smartphone software needs to be updated from time to time, especially when a new version of a smartphone device is introduced. Regarding this, most phone app need to synchronise with new software. The participants mentioned that if their banks understand these updates and inform their customers about them, this will affect their impression and reduce their fears about the app. For example, one interviewee said:

"*I know that the app needs to be updated from time to time with the updated iOS … my bank are aware about this and this means they protect my app from any weaknesses caused by the old iOS. Banks are aware of this phone's software which means more caring and protecting for the bank app"* interviewee A5.

Another example supports this view: *"My bank sends alerts to update the app as the iOS is updated … it means that security alertness from my bank is strong and definitely I will trust it"* interviewee A9.

Some of the interviewees believed that these synchronised updates were important for their trust, since this meant that they would not worry about its safety.

"If I did not see the app updated after my phone software had updated I would feel suspicious about using the app and I would wait for the bank to update their app or notify me" interviewee A3.

5.8.9.2*Alert customer in risk situation*

Participants mentioned that when the bank notified them about an app update and encouraged them to do it, they believed that their bank was responsive and this increased their trust. In addition, the interviewees pointed out that the bank's actions during hackers' attacks were significant for their trust. The interviewees mentioned that banks are critical for protecting their customers and their bank channels by advising them quickly not to use the application or any other online form of banking if there is a problem. For example,

"I remember when the country faced the hackers' attack … my bank sent an SMS to stop me using any online banking … I knew they should do more to protect their services but once I saw the message I felt more confident about my bank" interviewee A6.

"I tried to log into my app but every time I was rejected … later the bank announced that because of the hacker they had rejected any online banking … this increased my trust in continuing to use the app" interviewee A10.

However, some interviewees revealed that the security actions during the hacking period were not enough and that the banks should make extra efforts in such situations. Nevertheless, this action overall did not affect their trust as the bank informed the customers and the bank was aware of the security threat. For example*, "it's good for my bank to be aware about the security issues that the country faces … but they should do more"* interviewee A1*.*

5.8.10 The links and connections between the themes

To sum up, although there are some similarities between the themes, there are also considerable differences between them. For example, the comments on structural assurance and bank agility can be seen as being similar as both constructs emphasise bank app security. However, the essence of structural assurance is different, as it is more about bank security, safety policies, guarantees and legal controls, which need to be clear and strong in order to increase user trust (see Chapter 3, section 3.3.2.3). In contrast, bank agility reflects the bank's ''awareness" of any security threats or/and updating and synchronising bank apps with a new mobile operating system, and the role of the bank with regard to informing and notifying customers about these security updates. It was noted that some comments related to familiarity with the vendor and calculative-based trust are somewhat aligned in terms of the participants having experience with mobile bank vendors. However, the two constructs are different in the mobile banking literature (see Chapter 3 section 3.3.2.1 and 3.3.2.2). The comments from the participants reflect the fact that familiarity with the vendor is related to their general past experience and long-term relationship with their online or mobile banking provider (bank) and how

these affect user trust. On the other hand, comments on calculative-based trust reflect the fact that experience with bank reaction and response to any app incident will affect the participants' trust. Another comparison was raised between situational normality and the ease of use themes. Both constructs are centred on the ease of using the app. However, comments on situation normality are more precisely about the effortlessness of app login procedures and how these are similar to any other comparable apps, while the comments about the principle of ease of use consider the ease and clarity of using the app services. The final link can be seen from the participants' comments on the information quality and usefulness themes. These comments reflect the fact that the app will be more useful and beneficial once all the information is complete and transaction details are fully provided and correct. However, the differences between the two themes are clear as usefulness mainly concerns the app's advantages in general and how the app enhances and facilitates everyday banking, while information quality is centred on the information content provided by the app (see Chapter 3 section 3.3.3.1 and 3.3.3.2).

5.9 Chapter summary

This chapter presented the research results after applying the analysis methods. Confirmatory factor analysis and SEM were applied to the survey data. The measurement model was fitted by achieving an acceptable level in the fit indices. All of the hypotheses were supported except the relationship between usefulness, ease of use and information quality and trust, and between information quality and intention to use. Thematic analysis was

applied to the interview data. A new variable was raised, which we termed 'bank agility'. The next chapter will discuss the findings for this study. Also, the next chapter will compare the results from both sets of findings to provide deeper understanding of the research questions.

Chapter 6. DISCUSSION

6.1 Chapter introduction

The aim of this study was to examine customer trust in the context of the use of smartphone banking apps in Saudi Arabia. To achieve this aim, this study proposed a theoretical framework model based on the Gefen *et al.* (2003) and McKnight *et al.* (2002) trust models, TAM constructs and information quality.

In order to test and understand the proposed model, a mixed-methods approach was adopted. The survey profiled the views of bank customers in Saudi Arabia; it was developed based on previously published studies, with the adoption of existing measurement scales. Interviews represented the second data collection method, which offered deeper insights, gathered from bank customers who were studying in the UK. Both methods considered trust factors, technology adoption factors from TAM, and information quality.

This study developed 11 hypotheses and, for the purposes of data analysis, used the statistical software tools SPSS and AMOS, and the thematic analysis technique. The quantitative findings showed that trust factors such as structural assurance, situational normality, familiarity with the vendor, and calculative trust were the most statically significant factors in cultivating participants' trust. In contrast, adoption factors such as usefulness, ease of use, and information quality were statically not significant factors for trust. However, as consistent with previous TAM studies, usefulness and ease of use were significant with regard to intention to use.

The qualitative findings presented in the results chapter supported the research model. The factors of structural assurance, situational normality, calculative-based trust, and familiarity with the vendor were found to have an important role in participants' trust decisions. Intention to use was also statically significantly affected by customer trust. In addition, information quality had a considerable effect on trust. Although the other adoption factors, such as ease of use and usefulness, had no effect on participants' trust, intention to use was affected by the TAM constructs. Furthermore, a new factor emerged from the interview: bank agility. This factor has a considerable effect on customer trust in a mobile banking application.

This chapter compares the results of this thesis with those of the previous studies presented in the literature review in order to highlight the main contribution of this thesis. In this regard, the similarities and differences between the different studies are identified in order to add to the limited research on customer trust in and adoption of mobile banking. With regard to the online environment, the body of literature on the effect of trust antecedents on customers' overall trust is highly fragmented and contradictory; past research has mainly focused on a few trust types, such as those studied by Mortazavi *et al.* (2014) and Gao and Waechter (2017). Studies examining trust as a single variable have been conducted, for example, by Hajli (2015), Al-Gahtani (2011), and Nor and Pearson (2008). In this thesis, the role of trust in the use of a mobile banking app is examined by considering all the trust dimensions affecting ongoing trust. In addition, although some studies have highlighted the need for a specific context in

understanding customer trust (Shaikh and Karjaluoto, 2015), mobile banking apps on smartphones have been neglected with regard to such a context.

Although this study has adopted well-established trust models, which have existed for over 20 years, it is difficult for this study to identify whether generally ambivalent comments about trust dimensions in mobile banking apps, from customers in Saudi Arabia, are unique. In addition, it should be noted that the limited literature with regard to trust dimensions in mobile banking applications is somewhat problematic for this research, meaning the comparison of results with past research is more difficult.

This chapter organises the discussion of findings on the basis of the research findings. In section 6.2, the results from SEM and the findings from the quantitative phase of this research will be discussed first. These findings will answer the following research questions:

RQ1: How important is customer trust to customers' intention to use mobile banking smartphone applications?

RQ2: What is the relationship between trust types and customers' overall trust?

RQ3: What is the relationship between the adoption variables, such as TAM constructs and information quality, and customers' intention to use on the one hand and customer trust on the other hand?

Then, in section 6.3, the findings from the qualitative phase will be discussed. These findings will answer the questions raised from the quantitative phase and provide more insight for the following research question of this thesis:

RQ4: What are the customers' perceptions regarding trust types and adoption variables for their overall trust and use of mobile banking smartphone applications?

The rest of the chapter is organised as follows. The discussion of new variables raised from the interviews will be in section 6.4, while section 6.5 will provide insights into demographic variables. In addition, section 6.6 will compare this research framework's results with those of similar models presented in the literature review chapter. Finally, section 6.7 will provide the chapter summary.

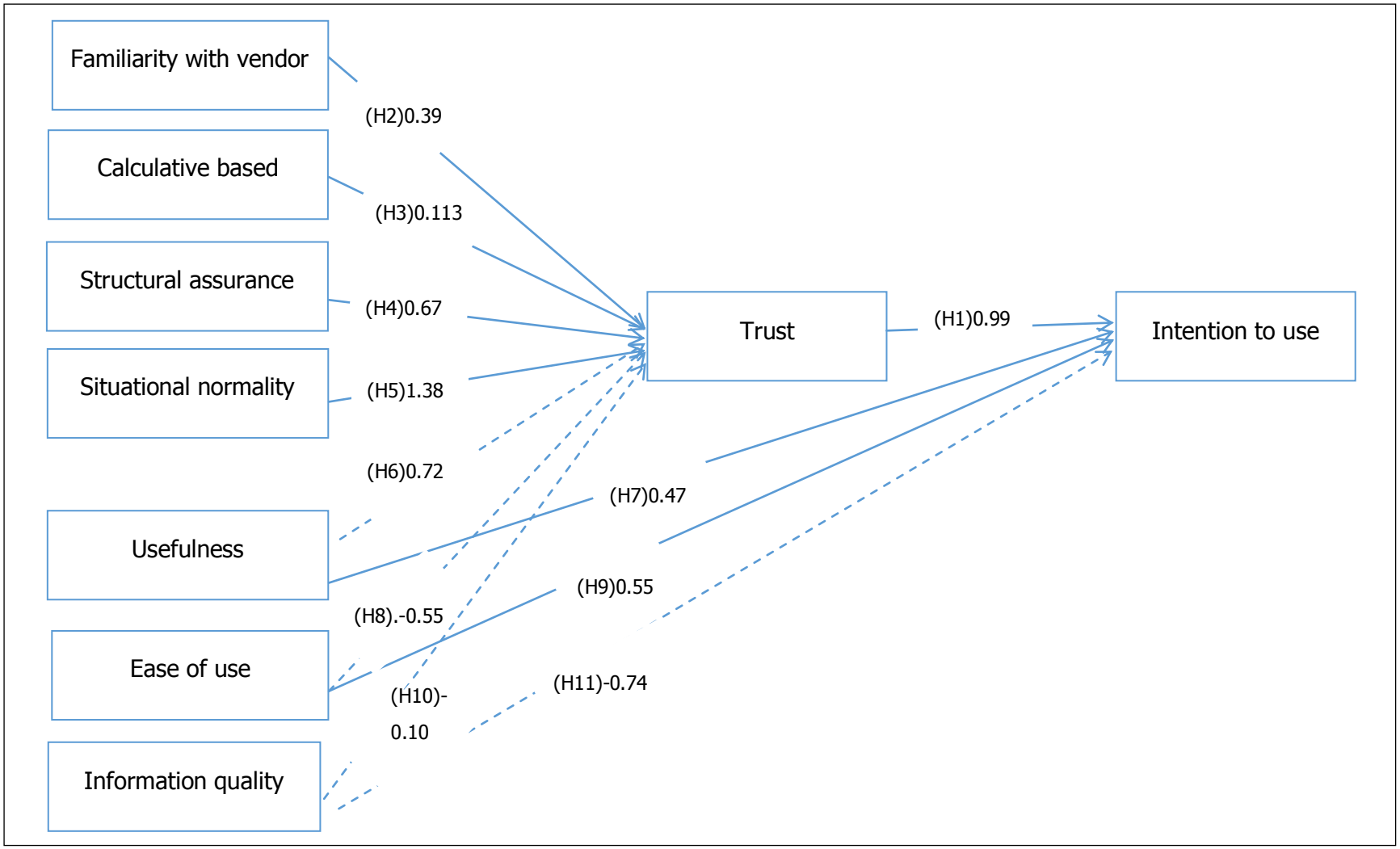

Figure 17:Final results from SEM.

6.2 Quantitative phase discussion

This section provides answers for RQ1, RQ2 and RQ3. The quantitative part of this study has determined that trust dimensions are vital for customers' trust decisions within the context of smartphone banking apps in Saudi Arabia. In addition, the continual use of mobile banking apps is articulated by customers' trust. Moreover, this section discusses the rationale of disapproved results in relation to the TAM construct and information quality with customers' trust.

6.2.1 Intention to use is influenced by trust

One of this thesis's hypotheses concerned customers' intention to use being directly influenced by their level of trust (see Figure 17). In order to assess whether or not this hypothesis was supported by the study findings, a path from trust to intention to use was included in the theoretical model. This theoretical path was evaluated, and it was shown to have a statically significant influence with p= 0.001 and β= 0.999. This thesis has confirmed this hypothesis within the context of mobile banking apps in Saudi Arabia. This is in agreement with the literature on mobile banking, including studies such as those of Gefen *et al.* (2003) and Gu *et al.* (2009). These studies reported that users' level of trust in technology was a direct determinant of their intention to use it in the future. Moreover, Wang *et al.* (2015) found that once trust has been created between customers and mobile commerce, there is a higher chance of the positive adoption of m-commerce services. This means, regarding a mobile banking app, customers are more willing to keep using the application if their trust in the app is strong.

There are other studies that do not agree with this finding. However, there are important differences between these studies and the current thesis. For example, the study conducted by Chemingui and Iallouna (2013) found that trust has no effect on customers' intention to use. This is because the sample they examined was composed of non-users of mobile financial applications. Considering that the current research examined the users of a mobile banking app in Saudi Arabia, the perception of customers who have used a mobile banking app will be different from those with no experience of this technology. In addition, this study confirms that in an online environment, with no face-to-face interaction, trust can affect customers' use of a mobile banking app. This differs to the results of Susanto *et al.* (2016), who emphasised that in online transactions, when there is no physical interaction, customers are more likely not to use the technology, unless they perceive high satisfaction in its use. The study of Susanto *et al.* (2016) examined e-banking through smartphones.

6.2.2 Familiarity with the vendor

It was hypothesised that familiarity with the vendor has a statically significant effect on customers' trust in using a mobile banking app. The findings from the survey provide evidence in support of this proposition: although the relationship between familiarity with the vendor and trust has a weak correlation at p=.04 and $\beta = 0.39$, the variable has an effect on customer trust (see Figure 17). This means, within smartphone banking, the more the Saudi customers become familiar with the mobile banking app vendor, the more willing they are to trust the mobile banking app, and therefore they continue to use the banking app. This has proved to be one of the main arguments of this thesis. This shows that

familiarity with the vendor plays a critical role in customers' trust decisions in the context of a mobile banking app.

Familiarity survey items were used to describe the customers' experience with the mobile banking vendor by using different digital channels for conducting their bank transactions. It was clear that with regard to mobile banking apps in Saudi Arabia, previous online experience with banks was telling regarding customer trust. Positive experiences with application providers led customers to be more willing to trust bank apps. This thesis's results are consistent with those which found that familiarity with the vendor has an effect on customer trust. For example, Yu (2015) discovered that, in using technology services provided by banks, customers gain experience over time. Thus, a customer's familiarity-based trust is highly correlated with their trust beliefs. This means that becoming familiar with a mobile banking provider influences customers' trust in the app, and this influences their intention to use. This outcome is in line with the findings of Rouibah *et al.* (2016), who asserted that Kuwaiti customers' trust in online shopping websites increases as they become familiar with the website provider. However, the current thesis result is inconsistent with the findings of Gu *et al.* (2009), who reported that familiarity was not important for trust. In their study, the item related to familiarity-based interaction was dropped. In this study, although familiarity still has an effect on trust, one familiarity item (FV11), which is related to interaction familiarity, was dropped due to poor loading.

6.2.3 Calculative-based trust

The proposed model hypothesised that calculative-based trust has a statically significant effect on customer trust in mobile banking apps. The survey analysis results revealed that customer trust is significantly affected by calculative-based trust at p=0.001 and β = 0.113 (see Figure 17). Thus, it can be confirmed that, in the smartphone banking arena, calculative based trust is fundamental for the ultimate trust decision regarding a mobile banking app. This is consistent with the findings of Gu *et al.* (2009), who reported that customers use calculative-based trust to rationally calculate the costs and benefits of their choice to trust in mobile banking.

However, this claim is not consistent with the results of Alqatan *et al.* (2016), who found that calculative-based trust has no effect on customer trust. Additionally, they argued that calculative-based trust has less effect on customer trust in mobile commerce than in e-commerce, suggesting that the effect of calculative-based trust tends to be major in the early stages of relationships between customers and technology. It may be that calculative-based trust is perceived differently by customers for different mobile commerce apps.

6.2.4 Structural assurance

In this research, it was assumed that trust is affected considerably by structural assurance. This hypothesis was supported by the survey findings at p=0.001 and β= 0.677 (see Figure 17). This study indicates that structural assurance is the most important trust antecedent in mobile banking apps in Saudi Arabia. This thesis supports the argument that structural assurance is vital for customer

trust in mobile banking in general, and banking apps in particular. This finding is in accordance with Luo *et al.* (2010), who found that out of four trust antecedents, structural assurance was the most influential. Structural assurance makes customers feel secure when using the banking app, due to features such as guarantees, safety nets or other security statements. In addition, this result is consistent with the view of Gu *et al.* (2009), who reported that structural assurance is the most influential dimension of customer trust in mobile banking. The same position is held by Zhou (2012a), who claimed that, in China, the mobile banking structural assurance terms need to be clear and strong in order for customers to feel safe when conducting mobile banking.

6.2.5 Situational normality

It has been suggested that situational normality has a crucial effect on customer trust in the use of mobile banking apps. The survey results supported this suggestion at p=0.001 and β=1.381 (see Figure 17). Thus, this study argues that within the context of smartphone banking, situational normality is a key variable in the customer's trust decision. The results of this study indicate that customers are reassured when the type of information requested by a mobile banking app is the same as the information requested when they use traditional services, or when they feel that their interaction with the app is similar to the interaction they experience with other websites. This result is supported by many empirical studies which found that customer trust and usage of mobile banking are affected by situational normality. For example, Wang *et al.* (2015) and Gu *et al.* (2009) asserted that when users feel that steps and processes to use mobile banking are similar to those in other

channels, such as offline banking and website banking, they will be more willing to trust mobile banking. Additionally, this study confirmed that customer trust will improve when a situation is normal, as consistent with the results of Ofori *et al.* (2017), who stated that in e-banking the users' level of trust will increase if situational normality exists.

6.2.6 TAM constructs (perceived ease of use and perceived usefulness)

This thesis found that usefulness and ease of use have no effect on trust, at p=.374 and β =-0.553 for ease of use, and p=0.297 and β =0.729 for usefulness (see Figure 17). In addition, it was confirmed that these constructs were statically significant in customers' intention to use mobile banking apps in Saudi Arabia, with β=0.553 for ease of use and β= 0.474 for usefulness, and both at p=0.001. Although the relationship between the TAM and trust was not supported, this thesis has confirmed the positive link between the TAM and customers' use of smartphone banking apps in Saudi Arabia.

The literature has extensively established the values of ease of use and usefulness in influencing customers' decisions to use technology in general, and mobile banking more specifically. This result contradicts several studies examining mobile banking and customer trust. For example, Agag and El-Masry (2016) emphasised that in the online travel community, usefulness and trust are linked to each other. However, their study context (the online travel community) does not involve any bank transactions or data, thus usefulness was important for users' trust. In addition, a study by Benamati *et al.* (2010) confirmed that usefulness is significant in customers' trust in using e-commerce

in the U.S. The study used websites that were unknown to the participants, thus it could be said that it examined initial trust, as the participants had no previous experience – a different situation from that of the current study in terms of types of examined trust. One possible explanation of the present result is that the majority of responses (81.5%) were from students and employees, thus time is critical for them. For example, they may not have had the time to conduct banking through different channels, such as e-banking or visiting ATMs. Therefore, a mobile banking app's benefits and utility might induce them to use the app, regardless of whether they perceive banking apps to be trustworthy. This could be an additional argument for this thesis.

A further explanation for this finding may be that the majority of the study's participants have already used smartphone apps in a variety of other contexts (71.6%). Their experience is varied, but those with previous experience of apps in general were most likely to be confident about using a mobile banking app. This study considers that with past experience of a variety of smartphone apps, customers are motivated to use bank apps because they are unaware of concerns over trust. The findings from the demographic variables show that 90% used both social media and entertainment apps. Thus, from the users' perspective, the use of a mobile banking app is compatible with their lifestyle, as most of the respondents were young. According to the General Authority for Statistics (2017), 47.28% of Saudi families use a smartphone. In addition, most of the smartphone users in Saudi Arabia are aged between 15 and 35 years. Furthermore, the number of users using smartphones in Saudi Arabia has increased in the last three years, making Saudi Arabia the third-ranked country globally in smartphone use (Arabnews, 2017). On the basis of their experience

using other apps (including banking), they perceived ease of use to be not significant for their trust (Venkatesh and Morris, 2000). Alternatively, as posited by Chan and Lu (2004), ease of use may no longer be a significant issue, because generally IT innovations are easy to utilise, as the developers of mobile apps have devoted much time and effort to making them easier to use. This is in line with Koksal (2016), who examined the use of mobile banking in Lebanon with the snowballing method, and found that the benefits delivered by mobile banking in Lebanon encouraged users to use this bank channel. In addition, by using a cross-sectional survey, Priya *et al.* (2018) asserted that usefulness is a key variable in customers' usage of mobile banking in India, as this channel saves time for users. Moreover, the results of this research reflect that the more customers perceive the mobile banking app to be easy to use, the more likely they are to continue using the app. This is supported by a recent study, which found that ease of use positively affects customers' intention to use mobile payments (Johnson *et al.*, 2018). Therefore, it can be stated and confirmed that TAM constructs are crucial for using mobile banking apps in Saudi Arabia, regardless of the trust caution.

6.2.7 Information quality

The results of the survey reflect a negative relationship between trust and information quality, with β =-0.100 at p= 0.153. In addition, the relationship between information quality and intention to use is statically not significant, with p= 0.458 and β =-0.742 (see Figure 17). This thesis failed to prove the link between information quality and customer trust and the use of mobile banking apps in Saudi Arabia. These are surprising findings for this thesis, as

the important link between trust and use with information quality was shown in Chapter 3.

Furthermore, these results are inconsistent with much research. For example, a study by Montazemi and Qahri-Saremi (2015), using a meta-analytic SEM method to analyse data from previous cases in online banking, found that information quality is important for trust in the post-adoption stage of using online banking. Moreover, by using quota and convenience sampling, Ponte *et al.* (2015) confirmed that quality of information has the greatest relevance for user trust when using an online purchase system (e-commerce). In addition, a recent study by Shareef *et al.* (2018) found that information quality is the main variable influencing mobile banking users to adopt the services provided by mobile banking apps, such as checking balances, communicating with the service provider, and engaging in sensitive financial operations. Although the results from all of these studies suggested that information quality has a positive effect on customers' intention to use, this research failed to prove this relationship.

There are various possible ways to explain this unexpected result. First, as the distribution time of the survey was between October and December 2016, when Saudi Arabia was facing several cyber-attacks, this situation may have affected the survey results, as the information presented in the app might have been incorrect, thus leading customers to trust the mobile banking app less. Such a situation was pointed out by Gao *et al.* (2015): if users find the quality of information presented disappointing, they will most likely not consider using and trusting the online system. Second, as users can check their information from different bank channels, information quality characteristics are not the

main interest for users, and do not impact their trust or usage. Third, during the analysis stage, the item related to finding relevant information (IQ11) in the banking app was deleted, due to high loading with another item (EASE55). Thus, the deletion of this item may have affected the overall results.

In summary, the quantitative phase highlights the contribution of this thesis. The thesis has contributed to smartphone banking literature by confirming the effect of trust dimensions in customers' overall trust. Moreover, the role of trust in determining the customers' continuing use of mobile banking was confirmed with the Saudi banking customers. It can be seen that the quantitative phase of this thesis provided limited evidence on customers' perception regarding the use of and trust in mobile banking apps in Saudi Arabia. However, there were some unexpected and unstable results presented. Some of the research hypotheses were not confirmed in the research model. Thus, a question raised regarding the nature of the relationship between the independent variables and dependent variable needs to be addressed fully.

RQ4: What are the customers' perceptions regarding the trust types and adoption variables in their overall trust and use of mobile banking smartphone applications?

To answer this question, customers' deep insights were generated from the qualitative phase of this thesis. In addition, these insights would help to provide explanations for unconfirmed hypotheses. The following sections will discuss the qualitative results for each variable.

6.3 Qualitative phase discussion

6.3.1 The role of trust dimensions in overall customer trust

The findings from the interviews confirmed the importance of the trust dimensions for overall customer trust. This thesis argues that there is a considerable role for the qualitative phase in terms of understanding customer perception of the use of mobile banking apps in Saudi Arabia. It is interesting to note that all of the trust dimensions of this study were confirmed and highlighted by the qualitative data. The advantages of the qualitative part involve providing rich data in terms of offering details and concepts of how mobile banking app customers in Saudi Arabia perceive trust dimensions in their overall trust decision. The interview findings reflected that familiarity with vendor is a considerable factor for their trust. The perception of familiarity with vendor is affected by the fact that a long relationship in using bank technology channels may affect customers' overall experience, thus influencing their level of trust. This study argued that having a long, positive experience with mobile banking is important in both forming trust and increasing intention to use. In addition, this thesis finds that calculative-based trust is not the most noteworthy factor in overall trust, but it does still influence it. As this study commenced with the aim of assessing the importance of customers' insight, the interview data has offered an explanation in terms of the types of benefits and costs that customers take into consideration when using mobile banking apps. For example, this study suggests that customer trust depends on the bank's reaction, and how the bank communicates with, responds to, and cares about its customers. Indeed, once customers feel that the bank has no intention of

breaking their trust through dishonesty or carelessness, the customers will trust the app and therefore increase their commitment to using the mobile banking app. These explanations of the importance of the familiarity of the vendor and calculative-based customer trust were asserted by Wang *et al.* (2015), who stated that having a positive experience with mobile banking is important in both forming trust and increasing intention to use. If the experiences are positive, customers are much more likely to commit to using mobile banking. Indeed, positive experience affects their decision to use any product from their bank and may affect their adoption of other banking services. Additionally, they reported that when people make choices based on trust, they use calculative-based trust to logically calculate the costs and benefits of that choice. The results of the interviews highlighted that structural assurance is the most important variable. This result is consistent with the views of Gu *et al.* (2009), who reported that structural assurance is the most influential dimension of customer trust in mobile banking. The security threats experienced by SAMA and some Saudi institutions over the last two years may be the reason why the participants indicated structural assurance to be the main variable for their trust. This is contradictory with Alqatan *et al.* (2016), who found that due to insignificant links between structural assurance and customers' trust, structural assurance in mobile commerce needs special definition terms to differentiate it from the mobile Internet in general, as these are different online areas for customers. However, this study does not find any different aspects that identify structural assurance in mobile banking. This study asserts that once the mobile banking app has a clear security statement and regulations, in addition to a strong security mechanism, customer trust in using the bank app will increase,

as will their commitment to using the app. Finally, the interviews indicate that situational normality is a considerable variable for customer trust. This thesis highlights the role of situational normality. With advances in technology, customers will be more inclined to trust the bank app if it has double-login steps and an advanced verification process, such as biometrics. These features give them the confidence to use the app. This finding is in agreement with Locke (2017), who emphasised that consumers will become more comfortable with using mobile banking when it incorporates strong login procedures, such as biometrics access and double authentication.

6.3.2 The role of TAM constructs (perceived ease of use and perceived usefulness)

The results of this thesis found that user trust will not be affected by the app's ease of use and usefulness, even if the mobile banking app is perceived to require less effort to conduct banking transactions and provides advantages in use for the customers. As this thesis highlights the contribution of using interviews to provide explanations for unconfirmed results, the interpretation from the interview was critical. This result is not consistent with the findings of Yang *et al.* (2015), who asserted that in China the users' trust of online payments is affected by ease of use but not by usefulness. The customers view ease of use and usefulness as being important in using the application, but their trust judgement depends more on other factors. The app features and benefits are things that encourage them to use, but not to trust. This thesis has determined that mobile banking app features such as quick access, and availability anytime and anywhere, are regarded as important, and motivate

customers to keep using an application. All of the participants agreed that ease of use and usefulness were important in their use. This is consistent with the work of Ozturk *et al.* (2016), who examined predicted use for mobile banking app users and non-users. Their results revealed that ease of use and usefulness are important antecedents for mobile banking users.

With regard to information quality, the findings of the interviews did not align with the survey results. This thesis stated that the quality of information provided by the app is vital, and it considered this to be one of the top variables affecting trust and use. This is consistent with the study of Gao *et al.* (2015), who examined mobile shoppers' behaviours with regard to online purchases in China. By using CFA, they found that information quality is the most effective variable regarding customer trust within mobile purchases. Additionally, this is consistent with the findings of Tam and Oliveira (2016), who used an online survey in Portugal to evaluate users' performance in using mobile banking. They asserted that information quality is critical for customers to use mobile banking. The interview findings reflected the fact that if information is accurate, reliable and updated, customers will trust the application. Equally, if the app provides inaccurate information regarding a customer's account, balance and bank information, the customer feels frustrated and is more likely to distrust the app. This result was supported by many researchers, including Tiwari and Buse (2007) and Jun and Palacios (2016). According to Jun and Palacios (2016), customers need the app to provide up-to-date, relevant and accurate information to increase their satisfaction and usage of the app. Moreover, the interview results reflected the outcome of the study of Ofori *et al.* (2017), who

found that information quality is a considerable factor in customers' trust and their promise to use e-banking.

As previously stated, the results from the survey and interviews are not identical. One possible reason for this conflict is the interview sample. All of the interview participants were postgraduate students living in the UK. Their experience with mobile banking in the UK revealed their feelings regarding information quality; as most of them use UK banking apps more than Saudi apps, the information presented in the app was, for them, a considerable theme for trust. Furthermore, they had no time to double-check their information through different Saudi bank channels. Another explanation is that the participants are far away from the Saudi physical banks, thus the quality of information presented by the application allows them to decide whether the application is trustworthy or not. Beldad *et al.* (2010) claimed that customers are not in a position to feel online transactions, and consequently the quality of information could be important for their trust. Additionally, Susanto *et al.* (2016) confirmed that customers are willing to trust smartphone banking if it provides advantages for them.

6.3.3 Bank agility

Following the use of thematic analysis in this study, a new theme emerged from the interview data. The theme concerns how interested banks are in keeping track of new technologies in the field and constantly updating their mobile banking app. In addition, there was an awareness of the need to broadcast news related to security threats affecting the mobile banking app. Furthermore, the theme concerns how quickly the bank responds to and adopts

advanced technology in order to improve the mobile banking application. After reviewing the literature for such phenomena, this study indicates that ”bank agility” is the best theme for the previous findings. This is consistent with much research defining bank agility in banking. According to the definition provided by Pourmohammad *et al.* (2016), an agile bank is one that is quick to adapt and change the services it offers to match the needs of the market, along with being flexible and introducing new services. In such a bank, personnel are able to predict customers' needs and thus respond quickly to meet their requirements, even if this means offering a new service. The quality of being agile is becoming necessary for banks, due to the wide range of market demands, the rapid advances in banking technology, and the falling costs of customer attrition. Aburub (2015) argued that agility has different and complex definitions, such as competency, responsiveness, flexibility and quickness. The data provided in this study is more in line with responsiveness and quickness. Further study of this variable may introduce more agility definitions.

This study finds that bank agility has a significant effect on customer trust, and therefore their intention to use mobile banking apps. Moreover, the study reveals that when customers notice that a bank is responsive and synchronises the bank app with phone software, their trust will increase. In addition, when the bank is aware of potential security threats, taking quick and effective action will increase customer trust. This is consistent with Suki's (2011) findings, where bank responsiveness was significant in customer satisfaction, thus their overall trust in mobile commerce increased. Additionally, Chamanifard *et al.* (2015) argued that in an agile bank, if the quality of customer service is improved, this will lead to customer queries being answered more quickly and

more services being offered, which will both retain existing customers and attract new ones.

6.4 Insights from demographic variables

Within the survey method, demographic variables are usually collected. For this research, the demographic variables are gender, age, qualifications and occupation. This section provides a discussion of the results from the multi-group analysis. Multi-group analysis was used to investigate any difference or moderating effect of the following demographic variables: gender, marital status, age, qualifications and occupation. The results of multi-group analysis indicate that there are no significant differences between the groups in using mobile banking apps in Saudi Arabia. The fit indices for each group model were achieved at an appropriate level, and all the hypotheses results from the multi-group analysis were confirmed with those of the original model (see table 32 and appendix H). This thesis highlights that the use of and trust in mobile banking apps in Saudi Arabia are not affected by demographic variables such as gender, age, marital status, qualifications and occupation. The findings showed that there is no significant difference in the usage of mobile banking in Saudi Arabia between the genders, as chi square differences between the female and male models were not significant at p= 0.63. This is an additional contribution of this thesis. However, this contradicts Al-Gahtani's (2011) findings, which revealed that gender has an important impact upon trust, and also upon discerned reliability, as precursors to e-transactions within the Kingdom of Saudi Arabia. By this means, Saudi women perceive trust to be more important in online transactions, in comparison to their male counterparts (Al-Gahtani,

2011). Although this study examined Saudi Arabia, the technology platforms are different. This could be also one reason for this conflicting result. Furthermore, Malaquias and Hwang (2016) found that men are more willing to trust mobile banking than women are. In addition, the difference between the age groups was insignificant at p=0.66. This means that trust in and use of mobile banking apps are not affected by age group in Saudi Arabia. Although most of the respondents in the thesis were young, and this may indicate that young people are more willing to keep using mobile banking apps, the results from multi-group analysis were not supported within the context of smartphone banking in Saudi Arabia. However, difference in age was seen, for some researchers, as a variable that affected customer trust. This was the case for Korobili *et al.* (2010), who discovered that people have a better attitude towards computers when they use them at a younger age. Possibly, the motivation of people to use computers at a younger age would enable them to be less nervous about using technology in the future. Furthermore, it was observed by Cruz *et al.* (2010) that younger people considered the use of mobile banking to be less complex, in comparison to older people. In addition, it was noticed by Akturan and Tezcan (2012) that the impact of discerned security and privacy risk on opinions of mobile banking was insignificant. It was indicated by the authors that this outcome can be interpreted through the age of the sample's respondents, who were aged between 18 and 25 years old. These outcomes reveal that young people have less susceptibility to perception of risk regarding technology; consequently, they are expected to have a greater degree of trust in mobile banking. Recent research by Malaquias and Hwang (2016) found that

in mobile banking in Brazil there is a negative relationship between trust and age, meaning that the level of trust is increased for younger customers.

The overall marital status model results indicate that there is no significance between the chi square of single and married groups at p=0.78. Although the path of calculative based trust was not significant, at p=0.05, for the married group, the p level was near to the overall significance level. Therefore, it can be assumed that marital status has no effect on trust dimensions. From the results regarding qualifications and occupation, no significance is apparent in the chi square difference at p=0.72 for qualification groups and p=0.74 for occupation groups. Although this research has not found any significant moderator effects of these two variables within the use of smartphone banking, most of the respondents were students and employees with high qualifications. However, this may indicate that with an adequate level of qualifications and a good occupation, the usage of mobile banking apps will not be difficult, and usage will therefore increase. The high level of experience in using the Internet and mobile apps has shed light in the overall results, as most of the respondents (99%) have used the Internet and mobile apps. This is consistent with Alalwan *et al.* (2018), who reflected that in e-banking the degree of education, and of Internet and computer experience, encourage users to participate in online banking, which is inexpensive and user-friendly; therefore, they are more likely to continue using online banking. Indeed, previous experience of the Internet and the occupation of the users would have influence on mobile banking apps in terms of saving time and increasing their performance.

The effect of Internet experience on user trust has been studied widely in the IS domain. For example, according to Brown *et al.* (2007), a lack of experience

could result in credulity and plausibility being attributed to all information obtained from the Internet. This contention is backed by studies which show that a greater degree of experience on the web is linked with lower levels of trust in online institutions; for instance, Aiken and Boush (2006) claimed that this could possibly be explained by users having a high degree of experience, and having therefore obtained adequate awareness of the possibility that problems can be experienced online at any time. On the other hand, Yousefi and Nasiripour (2015) claimed that experience with the Internet has no effect on customers' trust in e-banking.

It was discovered by other research studies that a high degree of Internet experience has an impact on the tendency of customers to trust Internet technology, consequently improving their trust of Internet-based transactions (Filieri *et al.*, 2015). This conflict over the effect of Internet experience on user trust could be a valuable area of further investigation.

In summary, the effect of demographic variables on user trust and intention to use has been studied widely in IS research. Although this thesis did not find any significant effect of the demographic variables, previous research, as indicated earlier, has proved the effect of these variables. In addition, as mentioned previously, there is no significant difference in the marital status model, although the calculative-based trust hypotheses were not confirmed. Thus, it is important to bear in mind the possible effect of marital status when using mobile banking apps in future research.

6.5 Comparing the proposed model with previous models

This section provides an overview of the proposed framework by comparing the framework with similar models presented in the literature review, such as those of Gefen *et al.* (2003), Gu *et al.* (2009) and Wang *et al.* (2015).

In this study it was difficult to compare the framework with past research, due to differences in context, sample, culture and the technology examined. However, as the proposed framework adapted the trust dimensions of Gefen *et al.* (2003), it was valuable in this research to compare the framework with Gefen's model. This study confirms that all trust dimensions – familiarity with the vendor, calculative-based trust, structural assurance and situational normality – are significant in customer trust in using mobile banking apps. In addition, the TAM constructs, ease of use and usefulness, show a significant effect on intention to use. These results are consistent with those of Gefen *et al.* (2003). However, it should be noted that in the study of Gefen *et al.* (2003) familiarity with the vendor is not a considerable factor, due to poor loading of familiarity with vendor measurements.

Additionally, this study failed to prove the relationship between TAM constructs and trust. In contrast with Gefen *et al.* (2003), only ease of use was examined and proved. However, as the model of Gefen *et al.* (2003) was examined in e-commerce, it is reasonable to compare the results of this study's framework with a similar model in mobile banking. The recent study by Chen and Rau (2014) investigated Gefen's summary of trust antecedents for Chinese e-commerce. They found that the four trust dimensions – familiarity with the vendor, calculative-based trust, structural assurance and situational normality –

are not applicable for the Chinese. However, it should be noted that their research approach and this study's research approach differ. For example, they used the experimental method, exposing the same sample (participants) to two different websites – one being business to customer, and the other being group buying. Based on the participants' experience with these websites, interviews and a questionnaire were conducted regarding the trust dimensions. Using this procedure may lead to inconsistent results, as the same participants are exposed to different online providers. Additionally, it could be the first time that some participants have engaged with these websites, thus their trust might be considered initial trust, which is not the interest of the current study.

As stated in Chapters 1 and 2, two studies have examined the trust dimensions in mobile banking in a single framework. The first study is by Gu *et al.* (2009); in their model they proved the effect of the trust dimensions, except familiarity with the vendor. In addition, they examined the effects of ease of use and trust; the link was disproved, which is consistent with the findings of this research. The second study is by Wang *et al.* (2015); their study examined the trust dimensions and how these dimensions affect trust. Their results are comparable to the results of this research.

With regard to customers' intention to use, the level of significance of TAM constructs on intention to use is lower than the effect of user trust on intention to use mobile banking applications. In other words, the more customers trust mobile banking apps, the stronger their intention to use the apps. This result is not consistent with Gefen *et al.* (2003) and Gu *et al.* (2009), who found that usefulness has the strongest effect on customers' intention to use, followed by trust and ease of use, respectively. However, with regard to the TAM influence

on intention to use, both studies, along with the present study, confirmed that usefulness has greater influence on users' intention to use than ease of use. This indicates that the users of mobile banking applications are more willing to use such applications if they perceive greater benefits and high effectiveness, rather than effortlessness of use. This is in line with the original TAM findings by Davis (1989).

However, there are some differences between this research framework and the aforementioned models. First, this framework includes information quality, ease of use, and usefulness as trust antecedents, although the results are disproved. Second, this framework was examined in a specific mobile banking type, the smartphone application, which presents a different research context to the studies mentioned above. Thus, the present results are different to the results of those studies.

Based on the discussion above, this study suggests an extension of the proposed framework by including some relationships. For example, one of the significant findings of this study is the relationship between bank agility, and trust and intention to use. Additionally, the model should incorporate demographic variables as antecedents to trust and intention to use. Due to the conflicting results regarding information quality and the limited interview sample, this study advises keeping information quality as an antecedent of trust and intention to use – there is still a need to investigate this variable.

6.6 Chapter summary

The main aim of this chapter was to discuss the outcomes of the analysis and results chapter. This chapter discussed the findings that helped to answer the research questions, and highlighted the contributions of this study. Section 2 discussed the quantitative part of this thesis, aiming to answer RQ1, RQ2 and RQ3. It highlighted the hypothesis regarding the importance of customer trust for customers' intention to use mobile banking apps.

Section 3 discussed the results from the qualitative part, and highlighted the contribution of this part in understanding customer trust and the use of mobile banking. In addition, this section provided details from the interview data to explain the unexpected quantitative results. This section also provided answers to RQ4. Section 4 provided a discussion in relation to the demographic variables results. Based on the outcomes of the discussion chapter, the contribution of this research and the implications for practitioners and future research are presented in the next chapter. In addition, the next chapter will provide several recommendations for Saudi banks.

Chapter 7. CONCLUSION

7.1 Chapter introduction

The conclusions that can be drawn from the research findings are presented in this chapter, along with the contribution that this study makes to the literature, its practical implications and recommendations for future research.

7.2 Review of the thesis rational and context

The setting of the thesis was outlined in chapter 1 together with details of the objectives, research context and summary of framework. The chapter recognised ongoing consumer trust to be a phenomenon which is essential to study as well as the application of mobile banking on a smartphone. Comprehensive research is necessary with regard to multidimensional concepts with such concepts being adapted in this chapter from Gefen *et al.* (2003) and McKnight *et al.* (2002). It was contended that the adoption variables and dimensions of the trust had a major impact on that trust generally; and consequently, on how consumers utilise mobile banking. Nevertheless, current research into mobile banking has notable limitations, one of which is the insufficient research on various dimensions of ongoing trust and their effect on trust generally. The trust dimensions have been analysed in the context of mobile banking generally by just two studies (Gu *et al.*, 2009, Wang *et al.*, 2015); and mobile banking smartphone application have not been examined together with trust types. Moreover, studies regarding mobile banking

applications conducted in the past have disregarded other variables which have been verified as being a significant precursor of customer trust as well as mobile banking utilisation like information quality and TAM principal concepts. Therefore, it is essential to propose and test a trust-based model in the context of specific mobile banking such as mobile banking smartphone application.

The selection of a mobile banking app in Saudi Arabia as the enquiry context was justified as a sector of social and economic significance, which is a very recent specific area of study. Mobile apps are being employed by the financial services sector at a growing rate in order to assist their customers in daily banking. There is evidence that scholars have overlooked this type of mobile app. The quality of banking apps has improved greatly and the standard of the application of smartphones as well as technological sophistication has increased. There is also evidence that Saudi Arabia has the largest number of customers using a mobile banking app between nine countries(see chapter one, section 1.6.2). Therefore, it was proposed to test and examine customers' trust and usage of mobile banking apps in Saudi Arabia. The proposed research framework for this thesis integrated the main adoption variables from online banking and mobile banking research such as TAM constructs and information quality streams into the trust dimensions adapted from Gefen *et al.* (2003) and McKnight *et al.* (2002). This research contributes to the literature on information systems in general, and in the mobile banking context in particular. It does this by testing existing theoretical models in an under-researched context (trust in mobile banking) and by gathering insights into the nature of consumers' trust judgements in this context. The aim was achieved through the following objectives:

1- To review the technology adoption theories in mobile banking and to summarise the key variables that affect customer use.

2- To summarise theoretical frameworks regarding trust in technology contexts and the key findings of previous studies on the different aspects and conceptions of trust in mobile banking.

3- To propose and test a trust-based model of the factors that affect customers' trust and intention to use Saudi mobile banking smartphone application.

4- To gather deeper insights into the factors involved in the use of mobile banking app and the interaction between these factors.

5- To provide recommendations in order to enhance the performance of Saudi banks and their mobile application.

The first objective was achieved by reviewing the previous research on mobile banking adoption and usage. Also, the main theories in technology adoption were explained (see Chapter 2). In order to address the second objective, a comprehensive review of the literature on trust within online technology was presented, mainly on e-commerce, m-commerce, e-banking and mobile banking. In addition, the importance of trust in mobile banking was discussed (see Chapter 2).

The third objective was addressed by establishing the research framework, which combined the trust dimensions and adoption variables in one research model. In order to test this model, an online survey with a seven-point scale was conducted in the context of two selected Saudi smartphone banking app,

associated with different banks. The collected data were analysed using SPSS and SEM. For the outcomes see Chapter 5.

Objective four was to evaluate users' perceptions of using mobile banking application in Saudi Arabia. This objective was addressed by undertaking semi-structured interviews. The interviews used a card-based method with ten interviewees; each card had one variable and its definition. Thematic analysis was used to analyse the data, and the details of this were explained in Chapters 4 and 5.

The last objective was to use the research findings to offer recommendations to Saudi banks so that they could make improvements to their mobile banking services, and to make recommendations to researchers for future work. This objective is fulfilled in this chapter.

7.3 Research Methodology

In order to achieve the aim and objectives as stated in section 7.2, a comprehensive literature review was conducted, which enabled the conceptual framework to be developed. In addition, mixed methods were used to gather the required data. A questionnaire was then designed, based on relevant factors revealed in the literature review. The factors identified were familiarity with vendor, structural assurance, situational normality, calculative-based trust, ease of use, usefulness and information quality. Seven-point scales with questions related to the trust dimensions and adoption variables in mobile banking application were used. The questionnaire achieved 640 responses from people who had used a smartphone banking application. Then, several analyses

were performed through SPSS and AMOS. SEM was then used to test the relationships between these factors and confirm the research hypotheses.

Then, interviews were used as second data collection tool. The card-based interview approach was used to examine the participants' perceptions of trust dimensions and adoption variables. Each card had one variable, together with its definition. After interviewing ten participants, thematic analysis was applied in order to analyse the data

7.4 Main Findings

As stated in Chapter 5, the following factors affect users' trust in using smartphone banking application: familiarity with vendor, structural assurance, situational normality, calculative-based trust, usefulness, ease of use and information quality. This research investigated the importance of trust in the use of mobile banking by examining the relationship between these variables and trust, as well as the relationship between trust and intention to use, as stated in Chapters 3 and 5. All of the hypotheses were confirmed except hypotheses H5, H7, H9 and H10.

One of the key findings from the survey was that customers' trust was affected by the trust dimensions, but not by the usability factors (H5,H7,H9). Moreover, from the survey, it was evident that ease of use and usefulness had an effect on the customers' intention to use, but that information quality (H10) did not. One possible explanation for the negative response with regard to information quality is that during the period when the survey was conducted there was a spate of cyber-attacks that affected government institutions and some Saudi banks. the findings from the interviews confirmed that all of the trust

dimensions had an influence on the participants' trust. Moreover, the interview data suggested that information quality affects participants' trust. Postponements in updating data and presenting inaccurate information in the application were the main issues discussed in information quality. Generating a new variable from the interviews was another major finding. This variable is called bank agility. This variable focuses on how aware the bank is of new technology and software developments in the smartphone arena. This included developments such as biometric access, iOS and Android updates, and face recognition. Once the users see how aware the bank is of such developments, their trust in the application is likely to increase, as is their use.

Overall, the results from the two approaches had some things in common. The most important of these is that both the survey and the interviews confirmed that all of the trust dimensions had an effect on the customers' trust. In addition, there was agreement that ease of use and usefulness influenced the use of mobile banking application in Saudi Arabia. The only major area of difference related to information quality. Although the survey data suggested that information quality has no effect on customer trust and intention to use mobile banking application in Saudi Arabia, the interviews suggested that this was not the case.

7.5 Contribution

This study provides several contributions to theory:

- This is the thesis is one of limited studies that has examined trust and trust types in the area of smartphone banking. This research has taken the newest banking channel, smartphone application,

as its research context. This study is unique because it looks at types of trust rather than treating trust as a single variable.

- This research is one of a limited number of studies that encompass trust dimensions and adoption variables in a single research framework within mobile banking (Gu *et al.*, 2009, Wang *et al.*, 2015). Only one of these studies has combined adoption variables with trust dimensions in one single research framework (Gu *et al.*, 2009). Researchers should note how adoption variables and trust are perceived by users to be important, and consider this when carrying out future research on trust in and usage of mobile banking.
- This study contributes to the theory as highlighted the importance to use of qualitative research approach to explore decision making processes when using a mobile banking app. The insights provided into trust in mobile banking app have been enhanced by the fact that this study employed mixed methods and used both quantitative and qualitative methods to gather more data in order to understand the role of trust in the banking area.
- It adds to the body of knowledge about mobile banking in developing countries, specifically Saudi Arabia. It explorers trust and trust dimensions within the Saudi Arabian online banking environment, as previous studies on trust in mobile banking have only viewed it as a single variable, rather than looking at the different types of trust.

The value of this study lies in the fact that little research has previously been conducted in this context in the domain of mobile banking use, trust and adoption. It therefore provides practical recommendations that will enable the providers of mobile banking services to improve the services they offer. In addition to these practical recommendations, the study makes a number of theoretical contributions.

7.6 Contribution to practice

The importance of trust in mobile banking is highlighted by this study's findings. These results have been applied in order to formulate recommendations for Saudi Arabian banks. One implication of this research is that the survey findings confirm the relationship between the trust and trust types within the smartphone banking environment in Saudi Arabia (section 5.7.2). Therefore, in terms of practice, banks should consider customer trust as a multidimensional construct and examine these dimensions on behalf of their clients in order to encourage them to use their services. As this thesis confirmed the major role of TAM constructs to customers who continue to use a mobile banking app (section 5.7.2), banks may wish to consider increasing the services which the application offers in order for the customer to gain further benefits from its use.

The findings from the interviews have informed the practice by providing greater detail on the perceptions of the bank's customers regarding their trust and use of smartphone banking (section 5.8.1). For example, this research finds that clear and strong safety guarantees that by using a bank app, participants' trust will increase (section 5.8.4)). Therefore, banks should ensure

that they clearly state the guarantees offered to customers who use their mobile banking services. Another implication of this thesis is that previous experience with mobile banking vendor has no impact on the participants' trust (section 8.8.2). Banks should pay attention to how their customers will experience all of their online channels, as customer experience in one channel can affect the expectations and trust levels for another. Moreover, this research declares the importance of bank agility for customers' trust (section 5.8.9). Therefore, the banks should take action quickly to inform customers of any security threats and of the steps they are taking to overcome them, as well as updating the app according to mobile software updating. Despite the fact that the survey disapproved of the link between information quality and TAM constructs and trust, the findings from interviews (see sections 5.8.6,5.8.7,5.8.8) can help the banks critically to examine their client perception of information quality when they develop their banking app.

These recommendations enable banks and businesses to see where further developments can be made in terms of mobile banking services. By following these recommendations, the final objective of this study is addressed and its principal aim is achieved.

7.7 Limitations of the study

The value of this research lies in its rich content by using mixed methods research, the large sample size and the fact that the framework was developed from established theories on trust and technology adoption. However, as with all research, it also has limitations. First, this is a cross-sectional design; therefore, the data regarding variables were gathered simultaneously, making it

impossible to verify a time order of the variables under consideration. Second, a convenience sample was used to collect the survey data; therefore, the findings from the survey are applicable only to that sample. Moreover, one of the significant findings of this study is the relationship between bank agility and trust and intention to use, it would be worth including this variable in the research framework, and conducting a further survey to explore the extent to which this variable influences either trust or intention to use.

Furthermore, many data-gathering methods which have been proved to decrease bias were not utilised as a result of restrictions of resources and time. For instance, non-respondents were not asked to be involved in any follow-up survey (Chisnall, 2001). Finally, it is worth noting that all the interviewees were Saudi students who were studying in the UK. Thus, their experiences with the UK banking apps may have affected their perceptions about Saudi banking app.

7.8 Future Research

This study produces several fields of future research. It is necessary for any future research to establish how this study's findings can be standardised for the purpose of including other technologies. The tested model of the current study is one means of attaining this, by analysing the elements which affect the use of Saudi consumers regarding shopping by mobile app. Moreover, the proposed model in this study can provide a draft for exploratory research in the future since few studies have been undertaken in Saudi Arabia on the topic of ongoing consumer trust in mobile commerce.

In the smartphone banking domain, it could be interesting to conduct additional research in multidimensional initial trust since this research concentrated on the

ongoing trust in multidimensional concepts. Also, this research has touched the relationship between trust and risk, however, given that neither the investigated model, nor any of the previous models explore trust and risk together, this might be a useful topic for further research. Risk occupies a major function in studies of consumer behaviour in particular, together with trust in the e-finance setting (Gefen *et al*., 2002). It is only in unforeseeable situations that trust is absolutely necessary because trust effectively implies that risks are presupposed and that there is vulnerability on the part of trusted parties (Hosmer, 1995). Trust will not be necessary where no risk exists; therefore, action may be undertaken in total certainty (Yousafzai *et al*., 2003). Therefore, risk and trust have a connection, since trust occupies a significant function in reducing the likelihood of becoming a victim of opportunistic behaviour (Ganesan, 1994; Fukuyama, 1995).

The effect of demographic variables on the application of technology has been a subject in information systems' research for a considerable time, despite the fact that the research undertook multi-group analysis for the moderate impact of demographic variables. According to Nosek *et al*. (2002), it is anticipated that demographic variables will have a major impact on a person's behaviour and understanding. Consequently, it may be interesting to examine demographic variables.

The Saudi population. provided participants for this study. It is increasingly evident that cultural orientation has an impact on consumer trust as well as on the application of technology in commence. For instance, Teo and Liu (2007) observed that in e-commerce, consumer behaviour and trust varies between cultures, which may consequently affect consumers' decisions to apply

technology. It will therefore be interesting to see if research, which involves international participants' verifies or disputes the findings. Also, since this research has examined the trust of customers from two different banks, it would to interesting to compare the samples since customer experience of banking apps varies between banks.

This research has applied qualitative data to supply more information regarding customer trust and understanding of the app. However, it is possible that research in future could apply this data type to obtain further knowledge into quantitative as well as qualitative data as shown here. This is because the mobile banking literature review presented in chapter 2 recognised the under-development in the qualitative work in this field.

Finally, this thesis suggests that in the future, research could be longitudinal for the purpose of discovering if the consumer's ongoing trust of mobile banking will change with time. Such research could examine the model as produced by the current study during various periods of time and also make comparisons. This would supply greater awareness of the phenomenon of utilising mobile banking apps.

The results of this research have made a valuable contribution to the existing literature on users' perceptions of mobile banking app, specifically in the context of Saudi Arabia.

7.9 Chapter summary

The chapters of the thesis are summarised in this chapter. Initially the research's aims and objectives were presented, and the way in which such objectives are attained were emphasised. Subsequently, this chapter presented

an outline of the data gathering, analysis tools and research methodology. Next, this chapter presented the principal results of the research. Then, the theoretical and practical contributions were highlighted. Finally, the limitations and future research were stressed.

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Appendixes

Appendix A: The process of the literature review

The table below demonstrate the process of the literature review which is informed by the thesis aim and objectives.

The Search terms were used with (AND, OR, NOT).	Smartphone development, app, app features, app in commerce, User intention, technology adoption, adoption, e-commerce adoption, m-commerce adoption, e-banking, internet banking, mobile banking, m-banking, mobile banking types, smartphone banking, TAM, TRA, TBA, Theory of Reasoned Action, Theory of Reasoned Action, technology acceptance, IS success model, user intention on technology, information quality, usefulness, ease of use, Online customer trust, e-trust, m-trust, mobile, user trust on technology, trust on e-commerce, trust on m-commerce, familiarity with vendor, calculative based trust, situational normality, structural assurance, institution based trust, trust type, ongoing trust, initial trust, trust model, Saudi e-banking, technology in Saudi. Below are some examples on how the term used together: *mobile banking AND customer trust. *technology adoption OR internet adoption *mobile banking application OR banking app
Databases searched	MMU library, MMU online data base, google website, JSTOR, ScienceDirect, IEEE Xplore, SpringerLink, ProQues ,google scholar
Years of search	2000-2018
Language	English, Arabic
Inclusion criteria (why did you include it?)	This thesis targeted claims or supporting evidence that contribute to the aim of the thesis with any research in e-commerce, m-commerce, m-banking focus on: 1- Gefen et al (2003) model 2- Customer on ongoing trust 3- Technology adoption theories within e-commerce, m-commerce, m-banking 4- Adoption studies involve information quality, ease of use and usefulness in mobile banking.
Exclusion criteria (why did you rule it out?	Any research in information systems that is not supporting the research aim and objectives, and any research that focusses on initial trust.

Appendix B: Sample Survey Questionnaire

Introduction:

You are invited to participate in a unique survey on the importance of customer trust in mobile banking. By completing this questionnaire, you will help the researchers to gain an understanding of the factors that can affect customer trust and the adoption of mobile banking in Saudi Arabia. The current research concentrates on smartphone banking application and the factors that affect customers' trust and decisions about using banking app.

The questionnaire is structured in an easy tick box format and is quick to complete and should take no more than 10-15 minutes of your time. The questionnaire consists of two parts, covering the customer's point of view regarding trusting and using banking app, and general information about you, respectively.

Respondents' anonymity and confidentiality will be respected and protected. Your information will be safeguarded and secured during and after the study.

This research is being conducted by researchers from the Department of Languages, Information and Communications at Manchester Metropolitan University.

For further information you can contact us by e-mail at:

Nada.s.alshamrani@stu.mmu.ac.uk.

j.rowley@mmu.ac.uk.

A mobile banking application is:

'a bank application that can be downloaded from a bank web site onto the customer's smartphone, and which enables the customer to carry out many bank transactions such as checking balances, and making transfers and payments.'

1. Do you use a mobile banking application?

- ☐ Yes
- ☐ No
  please go to part 2.
- ☐ Download the app but not use.
  please go to part 2

---

2. Please choose the bank/ banks you are client with:

- ☐ The Saudi samba Bank
- ☐ Al Rajhi Bank
- ☐ Both of the above.
- ☐ None of them.

Part one:- The following statements are designed to collect data on your attitudes towards banking app.

1= strongly disagree, **2**= disagree, **3**= nearly disagree, **4**= neutral or no opinion **5**=nearly agree, **6**= agree, 7= strongly agree.

1	**Usefulness**	**Strongly disagree**	⟷					**Strongly agree**
1.1	I can accomplish my tasks more quickly with a mobile banking app.	1	2	3	4	5	6	**7**
1.2	I can access mobile banking app at anytime and anywhere.	1	2	3	4	5	6	**7**
1.3	I think mobile banking app permit me to access the required information without problems.	1	2	3	4	5	6	**7**
1.4	I think mobile banking app permit me to access the required transaction without problems.	1	2	3	4	5	6	**7**
1.5	Overall, banking app are useful.	1	2	3	4	5	6	**7**
2	**Ease of use**	**Strongly disagree**	⟷					**Strongly agree**
2.1	I can utilise a mobile banking app with little mental effort.	1	2	3	4	5	6	**7**
2.2	It is not clear how to use the bank app.	1	2	3	4	5	6	**7**
2.3	I can accomplish banking tasks easily with mobile banking app.	1	2	3	4	5	6	**7**
2.4	I can learn how to use mobile banking app easily	1	2	3	4	5	6	**7**
2.5	Overall, using mobile banking app is easy.	1	2	3	4	5	6	**7**
3	**Information quality**	**Strongly disagree**	⟷					**Strongly agree**
3.1	I can access information relevant to me through a mobile banking application.	1	2	3	4	5	6	**7**
3.2	I can find reliable information through a mobile banking app.	1	2	3	4	5	6	**7**
3.3	I can find adequate information through a mobile banking app.	1	2	3	4	5	6	**7**
3.4	I will obtain accurate information from a mobile banking app.	1	2	3	4	5	6	**7**
3.5	I will find up-to-date information on mobile banking app.	1	2	3	4	5	6	**7**
4	**Familiarity with the vendor**	**Strongly disagree**	⟷					**Strongly agree**

4.1	I am familiar with my mobile banking provider through using their website.	1	2	3	4	5	6	**7**
4.2	I am familiar with my mobile banking provider through magazines, TV or newspapers.	1	2	3	4	5	6	**7**
4.3	I am familiar with my mobile provider through using mobile banking services such as SMS and web-based banking.	1	2	3	4	5	6	**7**
5	**Structural assurances**	**Strongly disagree**	⟷					**Strongly agree**
5.1	I feel safe when I do business with mobile banking app because of the statements of guarantees.	1	2	3	4	5	6	**7**
5.2	I feel safe using mobile banking app services because the banks have effective security mechanisms.	1	2	3	4	5	6	**7**
5.3	I feel safe using mobile banking app services because the advances on communication technologies can adequately protect me	1	2	3	4	5	6	**7**
5.4	I feel safe using mobile banking app services because they generally safe.	1	2	3	4	5	6	**7**
5.5	I feel not safe because the bank's statements of guarantees is not clear.	1	2	3	4	5	6	**7**
6	**Situational normality**	**Strongly disagree**	⟷					**Strongly agree**
6.1	The information that I am required to give when using mobile banking app is similar to that requested in online and offline banking.	1	2	3	4	5	6	**7**
6.2	The steps required in mobile banking app are typical of web-based mobile banking.	1	2	3	4	5	6	**7**
6.3	The steps required in mobile banking app are similar to those in SMS banking.	1	2	3	4	5	6	**7**
6.4	I feel safe using mobile banking app services because the interaction with mobile banking app is typical of most mobile app.	1	2	3	4	5	6	**7**
7	**Calculative-based trust**	**Strongly disagree**	⟷					**Strongly agree**
7.1	Mobile banking vendors have nothing to gain by being dishonest in their interactions with me.	1	2	3	4	5	6	**7**
7.2	Mobile banking vendors have nothing to gain by not caring about me	1	2	3	4	5	6	**7**
7.3	Mobile banking vendors have nothing to gain by not being knowledgeable when helping me.	1	2	3	4	5	6	**7**

7.4	Mobile banking vendors take long time to response for any issue regarding the app.	1	2	3	4	5	6	**7**
8	**Trust**	**Strongly disagree**	⟷					**Strongly agree**
8.1	Mobile banking app are trustworthy.	1	2	3	4	5	6	**7**
8.2	Mobile banking app keep their promises and commitments.	1	2	3	4	5	6	**7**
8.3	I believe that mobile banking app seek to deliver benefits to customers.	1	2	3	4	5	6	**7**
9	**Intend to use**	**Strongly disagree**	⟷					**Strongly agree**
9.1	I intend to continue to use mobile banking app in the future.	1	2	3	4	5	6	**7**
9.2	I will recommend others to use mobile banking app	1	2	3	4	5	6	**7**
9.3	I will frequently use mobile banking app in the future.	1	2	3	4	5	6	**7**

Part two: Information about you.
Finally, it would be most helpful if you could take a few minutes to provide some general information about yourself.

Please tick (√) the appropriate boxes below.

1. Gender □ Male □ Female	2. **Marital Status** □ Married □ Single
3. **Nationality** □ Saudi □ Non- Saudi	4. **Age** □ 20 or under □ 21- 30 □ 31- 40 □ 41 -50 □ 51+
5. **Highest level of education** □ Below high school □ High school □ Diploma □ Bachelor □ Higher education	6. **Occupation** □ Student □ Employee □ Retired □ House wife □ Other
7. Frequency of use of the Internet □ Daily □ Once a week □ Two or three times a week □ Once a month □ Less than once a month	**8. For what purposes do you use the Internet? (Please tick all that apply)** □ Email app □ Social media app □ Entertainment app □ Education □ Banking □ Other
9. How frequently do you use smartphone applications? □ Always □ Usually □ Sometimes	**10. What purpose do you use smartphone applications the most for? (Please tick all that apply)** □ Email app □ Social media app □ Entertainment app □ Education □ Banking □ Other

Appendix C: Arabic survey version.

أخي الكريم/أختي الكريمة

السلام عليكم ورحمة الله وبركاتة

اتوجه اليكم أنا الباحثة ندى الشمراني والمبتعثة لدراسة الدكتوراة في إدارة المعلومات جامعة مانشستر متروبولتين بالشكر والتقدير على إستقطاعكم ١٠ دقائق من وقتكم الثمين لتعبئة هذه الإستبانة.

هذه الإستبانة هي جزء من بحثي والذي يهدف إلى معرفة رأي عملاء البنوك في تطبيقاتها على الهواتف الذكية. راجية من الله أن يسهم هذا البحث في تطوير الخدمات البنكية بشكل عام.

ومن هذا المنطلق أحب أن أؤكد للجميع بأن البيانات والنتائج التي ستظهر من خلال هذا الإستبيان ستعامل بسرية تامة ولن يطلع عليها سوى الباحثة و أحب أن أنوه إيضا بأن الجميع له الحق بالإنسحاب قبل أو أثناء الإجابة على هذه الإستبانة.

مع التحية والتقدير

الباحثة / ندى الشمراني

طالبة دكتوراه-جامعة مانشستر متروبولتين- بريطانيا

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تعريف لتطبيق البنوك على الهواتف الذكيه:

تطبيق بنكي يقوم العميل بتحميله على هاتفه الذكي عن طريق موقع البنك الالكتروني مما يمكن العميل من إجراء عمليات بنكيه كألاستعلام عن الرصيد وتحويل وتسديد فواتير وغيرها.

هل انت مستخدم لتطبيق البنك على هاتفك الذكي:

- نعم
- لا
- قمت بتحميله ولكن لم أستخدمه

إذا كانت الإجابة ب لا أو قمت بتحميله ولكن لم تستخدمه , أرجو الإنتقال الى الجزء الثاني من الإستبيان.

إرجو إختيار البنك الذي تتعامل معه:

- الراجحي
- سامبا
- جميع ماسبق
- أخرى

الجزء الاول من الإستبيان: العبارات القادمه صممت لجمع معلومات عن رائك في تطبيق البنك حيث يمثل الرقم 7 الى موافق بشده والرقم 1 غير موافق بشده.

Usefulness	غيرموافق بشدة						موافق بشدة
1- يمكنني انجاز المهام البنكيه بسرعه أكبر من خلال تطبيق البنك	1	2	3	4	5	6	7
2 - يمكنني الوصول واستخدام تطبيق البنك في أي وقت و أي مكان	1	2	3	4	5	6	7
3- أعتقد أن تطبيق البنك يسمح لي بالوصول الى المعلومات المطلوبه بدون مشاكل	1	2	3	4	5	6	7
4 - أعتقد بأن تبيق البنك يسمح لي بتنفيذ العمليات المصرفيه بدون مشاكل	1	2	3	4	5	6	7
5- عموما, تطبيق البنك مفيد بشكل عام	1	2	3	4	5	6	7
Ease of use	غيرموافق بشدة						موافق بشدة
1- يمكنني الأستفاده من تطبيق البنك بدون جهد.	1	2	3	4	5	6	7
2- ليس من الواضح إستخدام التطبيق البنكي	1	2	3	4	5	6	7
3- يمكنني إنجاز العلمليات المصرفيه بسهوله من خلال استخدام التطبيق البنكي	1	2	3	4	5	6	7
4- يمكنني تعلم إستخدام التطبيق البنكي بسهوله	1	2	3	4	5	6	7
5- بشكل عام يعتبر إستخدام التطبيق البنكي سهلا	1	2	3	4	5	6	7
Information quality	غيرموافق بشدة						موافق بشدة
1- يمكنني من خلال التطبيق البنكي الحصول على المعلومات ذات الصله بي	1	2	3	4	5	6	7
2 - يمكنني العثور على معلومات موثوقه من خلال التطبيق البنكي	1	2	3	4	5	6	7
3 - يمكنني أن اجد معلومات كافيه على التطبيق البنكي	1	2	3	4	5	6	7
4- أستطيع الحصول على معلومات بنكيه دقيقه من خلال التطبيق	1	2	3	4	5	6	7
5-اجد المعلومات البنكيه على التطبيق البنكي محدثه بأستمرار	1	2	3	4	5	6	7

Familiarity with the vendor	غيرموافق بشدة						موافق بشدة
1- أنا على معرفه بمقدم خدمة التطبيق البنكي من خلال أستخدام موقع البنك الالكتروني	1	2	3	4	5	6	7
2- أنا على معرفه بمقدم خدمة التطبيق البنكي من خلال وسائل الاعلام والتلفزيون	1	2	3	4	5	6	7
3- أنا على معرفه بمقدم خدمة التطبيق البنكي من خلال إستخدام وسائل بنكيه أخرى مثل الموقع الالكتروني على الهاتف المحمول أو الرسائل القصيره	1	2	3	4	5	6	7
Structural assurances	غيرموافق بشدة						موافق بشدة
1- أشعر بالأمان في التعامل مع التطبيق البنكي بسبب الضمانات المقدمه من البنك	1	2	3	4	5	6	7
2- أشعر بالأمان في التعامل مع التطبيق البنكي لأن البنك لديه آليات أمنيه فعاله	1	2	3	4	5	6	7
3- أشعر بالأمان في التعامل مع التطبيق البنكي لأن تقدم الأتصالات التكنلوجي يزيد من الحمايه والأمان	1	2	3	4	5	6	7
4- أشعر بالخطر عند إستخدام التطبيق البنكي لأن ضمانات وسياسة البنك الإمنيه غير واضحه	1	2	3	4	5	6	7
5- عموما,أشعر بالأمان في التعامل مع التطبيق البنكي	1	2	3	4	5	6	7
Situational normality	غيرموافق بشدة						موافق بشدة
1- المعلومات البنكيه المطلوبه عند إستخدام التطبيق مشابهه الالكتروني أومن للمعلومات المطلوبه عند إستخدام موقع البنك خلال زيارة البنك	1	2	3	4	5	6	7
2- خطوات استخدام التطبيق البنكي على الهاتف المحمول مشابهه لخطوات إستخدام الموقع الالكتروني للبنك على الهاتف المحمول	1	2	3	4	5	6	7
3- خطوات استخدام التطبيق البنكي على الهاتف المحمول مشابهه لخطوات رسائل البنك القصيره	1	2	3	4	5	6	7
4- أشعر بالأمان عند إستخدام خدمات التطبيق البنكي لأن التفاعل مع التطبيق مشابهه لمعظم التطبيقات الأخرى على الهاتف المحمول	1	2	3	4	5	6	7
Calculative-based trust	غيرموافق بشدة						موافق بشدة
1-أعتقد مقدم خدمة التطبيق البنكي ليس لديه مايكسبه من خلال عدم المصداقيه في التفاعل معي	1	2	3	4	5	6	7

2- أعتقد مقدم خدمة التطبيق البنكي ليس لديه مايكسبه من خلال عدم الأهتمام بي	1	2	3	4	5	6	7
3- أعتقد مقدم خدمة التطبيق البنكي ليس لديه مايكسبه من خلال عدم تقديم المساعده لي	1	2	3	4	5	6	7
4- أعتقد مقدم خدمة التطبيق البنكي يستغرق وقت أطول للإستجابه لإي مشكله تتعلق بالتطبيق	1	2	3	4	5	6	7
Trust	غيرموافق بشدة	⟷					موافق بشدة
1- التطبيق البنكي جدير بالثقه	1	2	3	4	5	6	7
2- أعتقد أن التطبيق البنكي يحقق ويحفظ للمستخدم الالتزمات والوعود المقدمه منه	1	2	3	4	5	6	7
3- أعتقد ان التطبيق البنكي يقدم فائده كبيره للمستخدمين	1	2	3	4	5	6	7
Intend to use	غيرموافق بشدة	⟷					موافق بشدة
1- أنوي مستقبلا الأستمرار في إستخدام التطبيق البنكي	1	2	3	4	5	6	7
2- سأوصي بأستخدام التطبيق البنكي للأخرين	1	2	3	4	5	6	7
3- سوف أستمر بأستخدام التطبيق البنكي	1	2	3	4	5	6	7

الجزء الثاني:

يستغرق هذا الجزء بضع دقائق من وقتك و يهدف هذا الجزء الى جمع معلومات عامه عن العميل:

ارجو وضع علامة✓ عند الإختيار المناسب:

الجنس: • ذكر • انثى	الحاله الإجتماعيه: • اعزب • متزوج
الجنسيه: سعودي غير سعودي	العمر: • 20 واقل • 30-21 • 40-31 • 50-41 • 51 واكثر
المستوى التعليمي: • اقل من الثانويه العامه • ثانويه عامه • دبلوم • بكالوريس • دراسات عليا	المهنة: • طالب • موظف • متقاعد • ربة منزل • اخرى
معدل إستخدام الانترنت: • يومي • مره في الإسبوع • مره الى مرتين في الاسبوع • مرتين في الشهر • اقل من مرتين في الشهر	الهدف من استخدام الانترنت: • للايميل • التواصل الاجتماعي • للترفيه • للتعليم • للبنك • اخرى
معدل استخدام تطبيقات الهواتف الذكيه: • دائما • غالبا • بعض الوقت	الهدف من استخدام تطبيقات الهواتف الذكيه: • لتطبيق للايميل • لتطبيق التواصل الاجتماعي • لتطبيق للترفيه • لتطبيق للتعليم • لتطبيق للبنك • اخرى

Appendix D: Interview questions

Questions for the interview

Gender…, Age …

1- How long have you been using the mobile banking application?
2- Which bank application do you use:
    1- Alrajhi Bank
    2- SAMBA bank
    3- Both.
    4- None.
3- How do you think this variable effects your trust in the bank application? **NOTE: the variables definitions are on the second page**

1- Familiarity with the vendor
2- Situational normality
3- Calculative-based trust
4- Structural assurance
5- Information quality
6- Usefulness
7- Ease of use

4- Could you please order the above variables from 1 to 7, 1 is the most important and 7 is the less important.

1-	5-
2-	6-
3-	7-
4-	

5- Based on your order:

Why do you think this variable (your choice variable) is the most important for you?

Why do you think this variable (your choice variable) is the less important for you?

6- How do you think this variable effects your decision to use the mobile banking application?

- Information quality
- Usefulness
- Ease of us

Appendix E: Card with variables definitions

Familiarity with the vendor ***Experiences and knowledge based on previous interactions with mobile banking vendor.***	**Calculative-based trust** ***Users calculate the cost and the benefits if he/she decided to trust the application.*** ***"in case of any uncertainty on using the app the user believes that the bank has nothing to gain from this issue"***
Structural insurance ***Safety nets such as legal resource, guarantees, and regulations existed in mobile banking app***	**Situational normality** ***App steps are normal and similar to other online or app banking***
Usefulness ***Using the mobile banking app anywhere, anytime and quickly. Mobile banking app save my time.***	**Ease of use** ***Mobile banking app are easy to use, no effort required and clear to use***
Information quality ***App information is updated, relevant, reliable and accurate***	

Appendix F: Consent form

Nada Alshamrani

Manchester Metropolitan University

Nada.s.alshamrani@stu.mmu.ac.uk

Title of Project: Trust as an influencer of the intention to use mobile banking smartphone application in Saudi Arabia

Name of Researcher: Nada Alshamrani

Participant Identification Code for this project:

Please initial box

1. I confirm that I have read and understood the information sheet dated …….for the above project and have had the opportunity to ask questions about the interview procedure. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason to the named researcher. ☐
3. I understand that my responses will be sound recorded and used for analysis for this research project. ☐
4. I give/do not give permission for my interview recording to be archived as part of this research project, making it available to future researchers. ☐
5. I understand that my responses will remain anonymous. ☐
6. I agree to take part in the above research project. ☐
7. I understand that at my request a transcript of my interview can be made available to me. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Researcher	Date	Signature

Appendix G: Non-Response Bias, offline and online response results

Non-Response Bias

Item code	Item	Mean early response	Mean late response	Statistical Significance
USE1	Tasks accomplish more quickly	0.33	0.34	0.11
USE2	Access mobile banking app anytime and anywhere.	0.32	0.39	0.14
USE3	Access the required information without problems.	0.37	0.33	0.09
USE4	Access the required transaction without problems.	0.33	0.34	0.08
USE5	Mobile banking app are useful.	0.36	0.37	0.09
EASE1	Utilise little mental effort.	0.35	0.36	0.08
EASE2	Not clear how to use the bank app.	0.58	0.66	0.06
EASE3	Accomplish banking tasks easily	0.37	0.35	0.05
EASE4	Easy to learn	0.28	0.34	0.08
EASE5	Using is easy.	0.39	0.37	0.09
IQ1	Relevant information	0.37	0.36	0.09
IQ2	Reliable information.	0.29	0.25	1.08
IQ3	Adequate information	0.37	0.33	1.07
IQ4	Accurate information	0.36	0.34	0.09
IQ5	Up-to-date information	0.41	0.37	0.06
FV1	Familiar through bank website.	0.48	0.43	0.10
FV2	Familiar through magazines, TV or newspapers.	0.58	0.52	0.13
FV3	Familiar through using services SMS and web-based banking.	0.42	0.40	1.09
SA1	Statements of guarantees.	0.35	0.41	0.07
SA2	Effective security mechanisms.	0.27	0.34	0.71
SA3	Advances communication technologies	0.23	0.31	0.07
SA4	Statements of guarantees are not clear.	0.46	0.45	0.10
SA5	Generally safe.	0.33	0.34	0.08

SN1	Online and offline banking information are similar.	0.35	0.33	0.09
SN2	Steps are typical of web-based mobile banking.	0.58	0.55	1.01
SN3	Steps are similar to those in SMS banking.	0.53	0.56	1.54
SN4	Interaction is typical of most mobile app.	0.35	0.37	1.62
CT1	Vendors being dishonest in interactions	0.37	0.38	0. 74
CT2	Vendors not caring	0.38	0.32	1.79
CT3	Vendors not being knowledgeable when helping	0.39	0.31	1.03
CT4	Long time to respond	0.57	0.50	0.52
TR1	Trustworthy.	0.33	0.34	0.73
TR2	Keep their promises and commitments.	0.37	0.38	0.56
TR3	Deliver benefits to customers.	0.39	0. 42	0.09
IU1	Continue to use in the future.	0.25	0.30	0.06
IU2	Recommend others to use	0.23	0.28	0.07
IU3	Frequently use	0.25	0.31	0.06

Offline and online response

Item code	Item	Mean score offline	Mean score online
USE1	Tasks accomplish more quickly	0.32	0.35
USE2	Access mobile banking app anytime and anywhere.	0.31	0.33
USE3	Access the required information without problems.	0.36	0.34
USE4	Access the required transaction without problems.	0.32	0.37
USE5	Mobile banking app are useful.	0.35	0.39
EASE1	Utilise little mental effort.	0.34	0.38
EASE2	Not clear how to use the bank app.	0.57	0.61
EASE3	Accomplish banking tasks easily	0.36	0.38
EASE4	Easy to learn	0.27	0.30
EASE5	Using is easy.	0.38	0.36

IQ1	Relevant information	0.36	0.38
IQ2	Reliable information.	0.28	0.24
IQ3	Adequate information	0.36	0.36
IQ4	Accurate information	0.35	0.32
IQ5	Up-to-date information	0.39	0.30
FV1	Familiar through bank website.	0.47	0.47
FV2	Familiar through magazines, TV or newspapers.	0.58	0.55
FV3	Familiar through using services SMS and web-based banking.	0.40	0.46
SA1	Statements of guarantees.	0.30	0.35
SA2	Effective security mechanisms.	0.22	0.24
SA3	Advances communication technologies	0.26	0.26
SA4	Statements of guarantees are not clear.	0.48	0.49
SA5	Generally safe.	0.38	0.31
SN1	Online and offline banking information are similar.	0.33	0.32
SN2	Steps are typical of web-based mobile banking.	0.52	0.57
SN3	Steps are similar to those in SMS banking.	0.56	0.54
SN4	Interaction is typical of most mobile app.	0.31	0.36
CT1	Vendors being dishonest in interactions	0.38	0.39
CT2	Vendors not caring	0.34	0.39
CT3	Vendors not being knowledgeable when helping	0.35	0.39
CT4	Long time to respond	0.55	0.52
TR1	Trustworthy.	0.38	0.33
TR2	Keep their promises and commitments.	0.34	0.39
TR3	Deliver benefits to customers.	0.30	0. 39
IU1	Continue to use in the future.	0.27	0.28
IU2	Recommend others to use	0.29	0.26
IU3	Frequently use	0.28	0.26

Appendix H: Multi group hypothesis tested results

GENDER

		Male		Female	
	Hypotheses	Estimate	P	Estimate	P
H2	Familiarity with vendor -----> Trust.	1.748	***	1.773	0.03
H3	Calculative-based trust -----> Trust.	0.776	***	1.786	***
H4	Structural assurance-----> Trust.	1.925	***	0.740	***
H5	Situational normality -----> Trust.	1.042	***	0.528	***
H6	Usefulness -----> Trust.	1.857	0.324	0.673	0.112
H8	Ease of use -----> Trust.	1.828	0.297	0.724	0.152
H10	Information quality -----> Trust.	1.633	0. 704	0.742	0.101
H7	Usefulness -----> Intention to use.	0.628	***	1.145	***
H9	Ease of use -----> Intention to use.	1.752	***	1.071	***
H11	Information quality -----> Intention to use.	1.638	0.105	1.796	0.071

MARITAL STATUS

		Single		Married	
	Hypotheses	Estimate	P	Estimate	P
H2	Familiarity with vendor -----> Trust.	1.109	***	0.770	***
H3	Calculative-based trust -----> Trust.	1.003	0.06	0.968	0.05
H4	Structural assurance-----> Trust.	1.075	***	1.762	***
H5	Situational normality -----> Trust.	1.172	***	1.430	***
H6	Usefulness -----> Trust.	1.154	0.241	1.102	0.212
H8	Ease of use -----> Trust.	0.984	0.217	1.080	0.238
H10	Information quality -----> Trust.	1.035	0.304	1.472	0.934
H7	Usefulness -----> Intention to use.	1.770	***	1.346	***
H9	Ease of use -----> Intention to use.	0.968	***	0.976	***
H11	Information quality -----> Intention to use.	1.162	0.07	1.320	0.215

AGE

		20 or under		**21-30**		**31-40**	
	Hypotheses	Estimate	P	Estimate	P	Estimate	P
H2	Familiarity with vendor -----> Trust.	0.232	***	0.416	***	1.319	0.03
H3	Calculative-based trust -----> Trust.	3.845	***	2.314	***	2.325	***
H4	Structural assurance-----> Trust.	0.524	***	0.319	***	1.702	***
H5	Situational normality -----> Trust.	2.349	***	0.325	***	0.609	***
H6	Usefulness -----> Trust.	0.699	0.324	1.702	0.324	0.935	0.241
H8	Ease of use -----> Trust.	0.306	0.297	2.609	0.297	0.934	0.217
H10	Information quality -----> Trust.	0.961	0.704	1.935	0. 704	0.832	0.304
H7	Usefulness -----> Intention to use.	3.648	***	1.934	***	0.405	***
H9	Ease of use -----> Intention to use.	0.477	***	0.832	***	1.351	***
H11	Information quality -----> Intention to use.	2.869	0.105	0.416	0.105	1.302	0.07

OCCUPATIONS

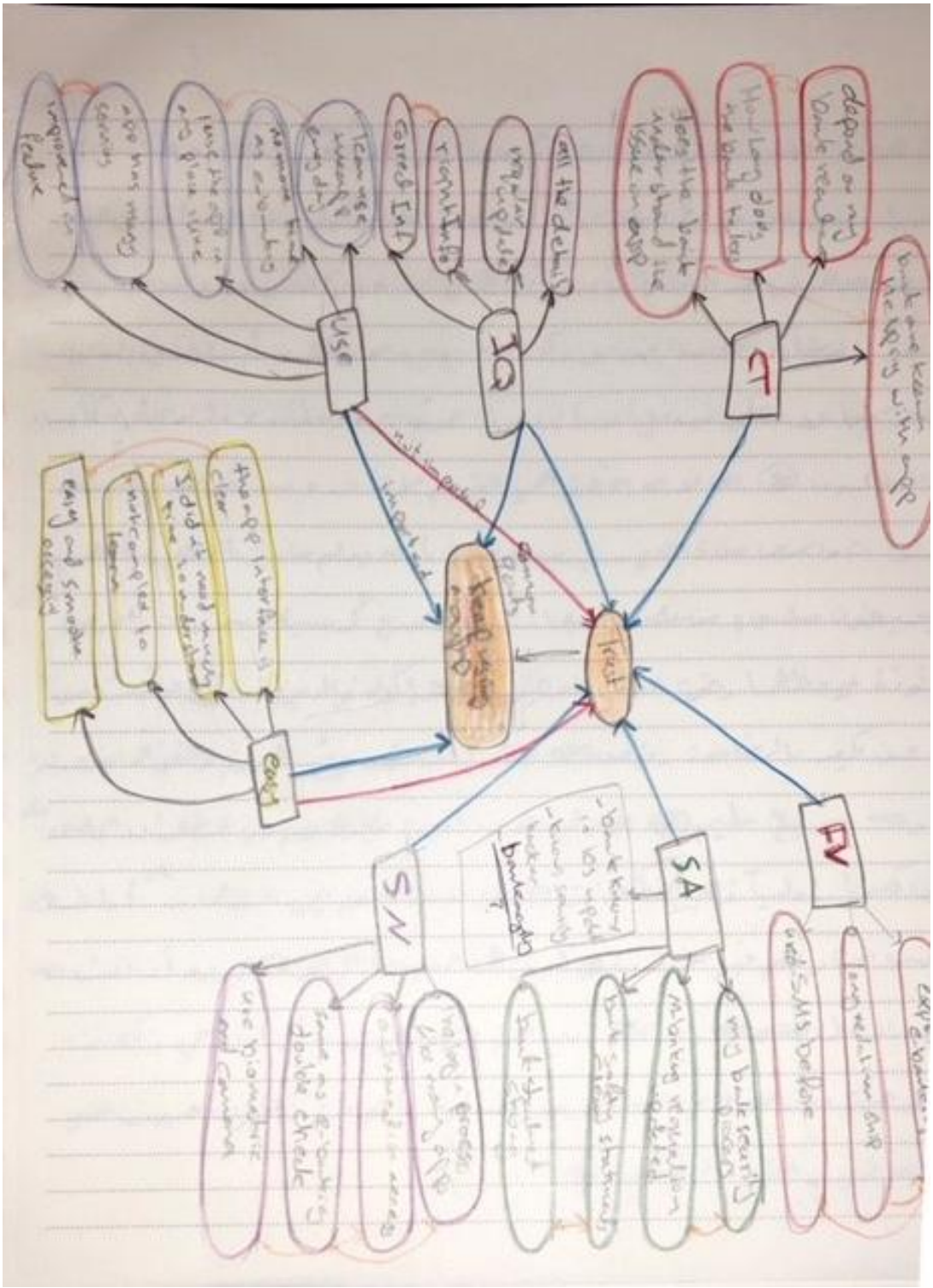
		Employee		**Student**	
	Hypotheses	Estimate	P	Estimate	P
H2	Familiarity with vendor -----> Trust.	0.601	***	0.113	***
H3	Calculative-based trust -----> Trust.	1.328	***	0.072	***
H4	Structural assurance-----> Trust.	0.131	***	1.060	***
H5	Situational normality -----> Trust.	0.270	***	2.502	***
H6	Usefulness -----> Trust.	0.778	0.412	0.931	0.113
H8	Ease of use -----> Trust.	0.605	0.197	0.079	0.072
H10	Information quality -----> Trust.	0.068	0.361	0.474	0.080
H7	Usefulness -----> Intention to use.	.530	.374	0.63	***
H9	Ease of use -----> Intention to use.	.503	***	0.374	***
H11	Information quality -----> Intention to use.	.140	.153	0.109	0.079

EDUCATION

		Bachelor degree		**Higher degree**	
	Hypotheses	Estimate	P	Estimate	P
H2	Familiarity with vendor -----> Trust.	0.862	***	1.618	***
H3	Calculative-based trust -----> Trust.	0.851	0.003	0.288	0.002
H4	Structural assurance-----> Trust.	0.820	***	1.151	***
H5	Situational normality -----> Trust.	0.727	***	2.220	***
H6	Usefulness -----> Trust.	1.860	***	0.826	0.112
H8	Ease of use -----> Trust.	0.886	0.197	0.721	0.651
H10	Information quality -----> Trust.	0.879	***	0.075	0.374
H7	Usefulness -----> Intention to use.	0.892	0.074	1.865	***
H9	Ease of use -----> Intention to use.	1.714	***	1.677	***
H11	Information quality -----> Intention to use.	0.799	0.130	1.554	0.145

Appendix I: Thematic maps for the interview.

The initial thematic map



The revised thematic map